- Effect of pulping variables
- Methods of applying coatings
- Sales promotion of paper products
- Design improvements of large ac motor drives

The Paper Industry

Publishers of PAPER AND PULP MILL CATALOGUE

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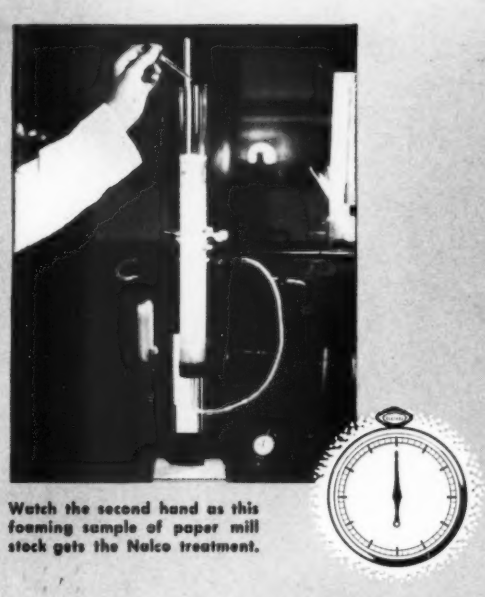
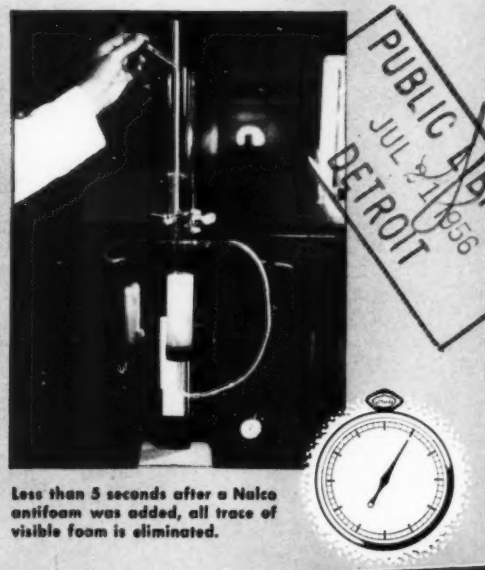


Watch the second hand as this foaming sample of paper mill stock gets the Nalco treatment.



Less than 5 seconds after a Nalco antifoam was added, all trace of visible foam is eliminated.

furthermore... **Nalco GETS THE DROP ON FOAM YOU CANNOT SEE!**

NATIONAL ALUMINATE CORPORATION
6232 West 66th Place, Chicago 38, Illinois
CANADA
Alchem Limited, Burlington, Ontario
NORTHWESTERN UNITED STATES, HAWAII AND ALASKA
The Flox Company, Inc., Minneapolis 3, Minn.
ITALY: *Nalco Italiana, S.p.A.* SPAIN: *Nalco Espanola, S.A.* WEST GERMANY: *Deutsche Nalco-Chemie GmbH.*

●The simple demonstration above leaves no doubt that Nalco chemicals quickly and effectively eliminate all visible foam.

But here are even more conclusive findings: (1) In a mill where there was *no visible sign* of foam, the application of a Nalco antifoam quickly produced a very substantial increase in screening efficiency . . . and overall production; (2) In another mill, Nalco chemicals solved the problem of an erratic Decker level where there seemingly was no foam. Here, too, production went up through increased Decker capacity.

Simplest explanation of Nalco effectiveness is the dual action—*antifoam* action to prevent bubbles from forming . . . *defoaming* action to combat existing foam! Your Nalco Representative has all the facts, or write direct.

THE Nalco® SYSTEM . Serving the Paper Industry through Practical Applied Science

(Aerial view Abitibi Mill, Smooth Rock Falls, Ontario)

MEAD GIVES YOU THE QUALITY OF PULP YOU NEED

Mead has the quality pulps to fit your needs, whether chemical or mechanical, from hardwoods or soft woods, bleached or unbleached. These come from such a wide geographical range as Ontario, British Columbia, New Brunswick, Georgia, Tennessee, Maine and Wisconsin.

Abitibi Bleached Sulphite

Produced from the matchless characteristics of Canadian Black Swamp Spruce, for more than a quarter of a century Abitibi Bleached Sulphite has successfully answered the requirements of leading manufacturers of tissue, white papers and board. Outstanding for cleanliness, printability and strength, Abitibi Pulp is also known for its brightness, workability, and rapid development to maximum Mullen.

Tell us what *your* pulp requirements are, and we'll be glad to have our representative call at your convenience to tell you how we can best serve your needs.

MEAD PULP SALES, INC. • **Distributors of Wood Pulp**

BLEACHED AND UNBLEACHED CHEMICAL AND MECHANICAL WOOD PULP

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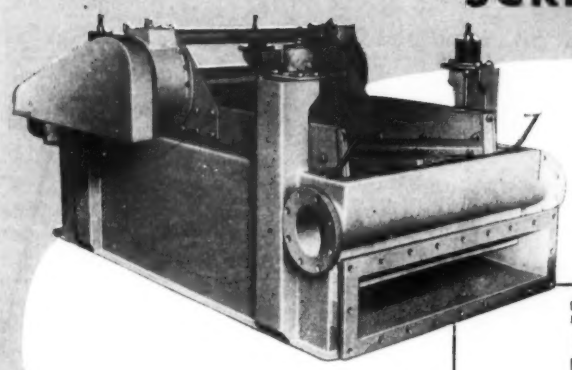
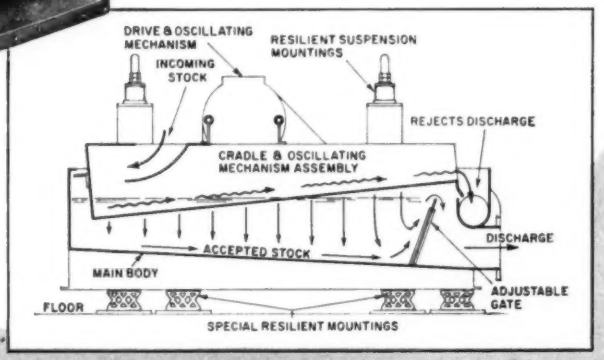
MEAD *pulp*

GYRO-FLOTE*
SCREEN



A product of Black-Clawson's stock preparation machinery division.



for many pulp, paper and board mill applications

The new Black-Clawson Gyro-Flote screen is a self-contained, flat plate vibratory unit which employs a gyroscopic principle of oscillation to provide a rapid, gentle action. A highly efficient screen, the Gyro-Flote recovers all usable fibre and rejects unusable material and trash.

In a groundwood pulp system it will serve as a bull screen or tailing screen. In a chemical or semi-chemical system, it is used as a knotter screen, and for paper machine screen rejects—also as a primary screen after the washers. It's especially effective in a waste paper cleaning system.

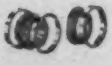
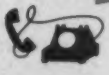
Gyro-Flote capacity depends on the application and size of perforations. Power input remarkably low.

Contact the Shartle Division for details on operation and performance.

*Trademark

The BLACK-CLAWSON Company

SHARTLE DIVISION • MIDDLETOWN, OHIO

Combine the low rolling friction of a ball add the greater load-carrying capacity of a roller and see the basic advantages offered you in a Shafer "self-aligning" Bearing. In a Shafer Bearing the inner race is a segment of a true sphere and rollers are concave so that loads are carried on more than half of center area contact Even under conditions of shaft deflection (and the truest shaft misaligns under operating stress and strain) Shafer rollers keep in line with the direction of race rotation--providing automatic self-alignment. Contact remains in center area without loss of capacity or extra wear as in the average roller bearing, where deflection shifts the load area to roller edge reducing capacity, causing uneven wear, pinching and binding. Add such exclusive Shafer features as positive "Z" seals, Micro-Lock adjustment that compensates for wear, and you'll see why in designing or replacing <u>all</u> industry looks for **SHAFER** on Pillow Blocks Flange Units Cartridge Units Flange Cartridge Units Take-up Units Duplex Units Take-up and Frame Units and Self-Contained Bearings  Call  or write Shafer Bearing Division of Chain Belt Company, 801 Burlington Ave., Downers Grove, Illinois.

leading Bearing Design for more than 33 years!

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CHAIN BELT COMPANY

The Paper Industry

Technology • Engineering • Management • Production

VOLUME 38 • NUMBER 4 • JULY 1956

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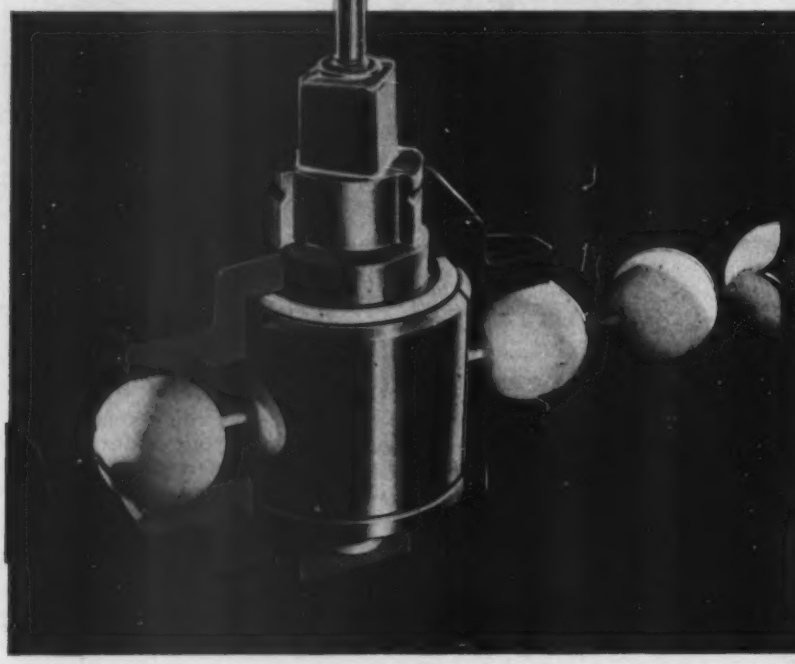
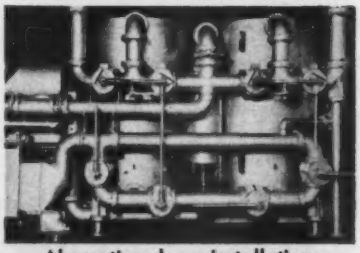
acf Lubricated Plug Valves

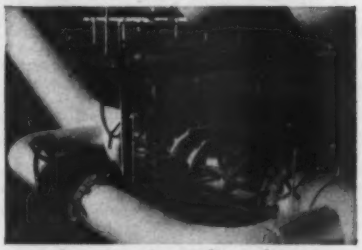


ROUND PORT MEANS FREE FLOW ALL THE WAY

In salt water disposal plant.



Absorptive dryer installation.



In natural gasoline plant.

You get full volume, unrestricted flow throughout the entire piping system when you use acf Round Port Valves.

The pipe-matching port openings cause no loss in head pressure—offer no more resistance to flow than the pipe itself. There are no obstructions—no turbulence and no harmful abrasive effects from solids in suspension. Even the most heavy viscous ladings flow freely through acf Round Port Valves.

Split-second quarter-turn shutoff, non-wedging cylindrical plug, Teflon* head gasket, are additional advantages that add to perfect performance of acf Round Port Valves—that mean extra long trouble-free service—lower maintenance costs and fewer work stoppages.

Act now to step up valve performance—to keep maintenance costs down. Representatives in 50 principal cities.

*DUPONT TRADE NAME

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acf LUBRICATED PLUG VALVES

KEY RETURN BENDS AND FITTINGS

Close contact with research department needed for successful market research

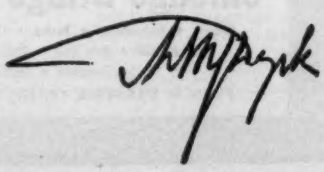
Market research is as essential to the pulp and paper industry as technical research, engineering and production. No manufacturing concern can remain competitively strong unless it knows: (1) what are the many possible applications of its products; (2) what volume of the product—potential and immediate—can be absorbed by the market; (3) what sales price can the product command in its various applications on the market; (4) how should the product be used to best advantage, and (5) what new paper products have the best chance of finding a ready market.

In an article entitled "Sales Promotion of Paper Products" in this issue, Warren B. Bullock draws attention to the present trend toward cooperative market research and cites examples of such cooperative efforts with some of the outstanding accomplishments made.

Whether market research is done as a cooperative or an individual effort by various manufacturing concerns, the most important factor for obtaining maximum success is the establishment of as nearly perfect communications as possible between the technical research department and the market research, sales and advertising departments. It is the team-play and the two-way exchange of ideas between these departments that provide the most correct answers needed for the sales promotion of the company's products. It is through such close contact that the market researcher and the salesman can acquire the understanding of the technical aspects of the products to enable them to ask and answer the right questions in the field and evaluate correctly the information received. A thorough knowledge of the product, its uses and potential applications will further put them in a better position to learn, sometimes from a casual remark overheard in the field, something about the competitors' plans.

There is no doubt that the future for paper products remains exceedingly bright on both the national and world markets. This is especially true of the paper products that are modified or upgraded through the use of the many plastics now available.

While the general outlook is bright, a competitive industry must necessarily aspire to the highest degree of accomplishment. From our point of view, maximum success in the promotion of paper products can be achieved only if market researchers and salesmen keep thoroughly informed about their company's products through the closest possible contact with the technical research department, while the latter in turn can receive many hints and suggestions about trends and potential consumer wants through an enlightened sales force.



SAVE-ALL lives up to its name at boardmill

Shown above is a Marx Save-All built by Chicago Bridge & Iron Company for use at an eastern boardmill. The Save-All was installed to recover valuable waste fibers from white water and to alleviate stream pollution. How's it doing? The latest month for which figures are available shows that the Save-All is recovering 97.4% of all fibrous solids that pass through it. Stream pollution is reduced to a like degree.

In addition to the efficient Marx Save-All, we also build elevated water tanks, storage tanks, digesters and other special steel plate structures for every pulp and paper mill need. Write our nearest office for complete information.

CB&I

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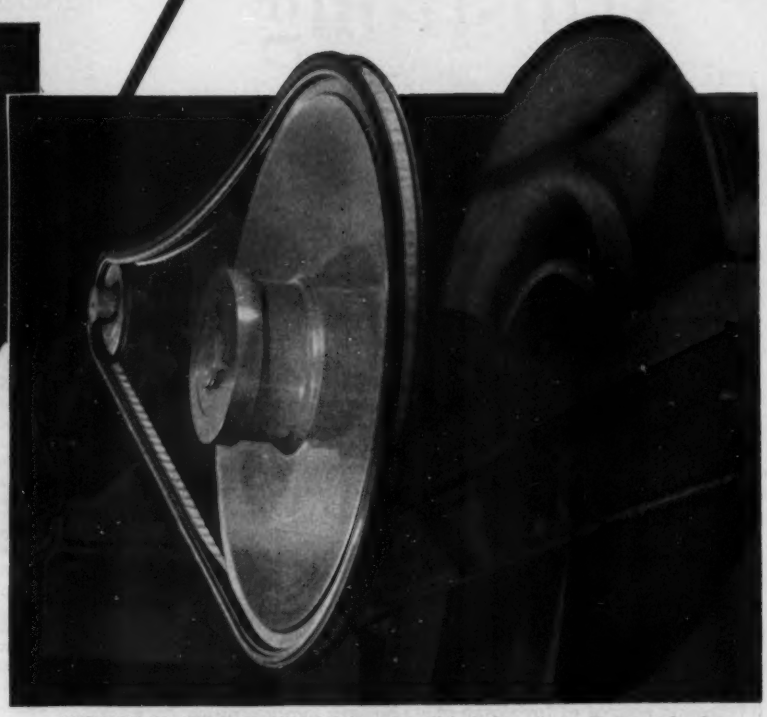
Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.

It's not just static strength...

RESISTANCE TO TENSILE STRESS is achieved by use of properly heat-treated, accurately-machined side bars made of premium steel and fitted with properly-hardened pins, bushings and rollers. But to resist *operational* stresses, additional controls over dimensional accuracy, uniformity and roller resiliency are essential.



STRENGTH OF CHAIN IN MOTION is accomplished through tensile strength *plus* special Link-Belt refinements. These include pitch-hole preparation, micro-finish of parts, special processing of sidebars, prelubrication and rigid quality control from initial selection of materials to final protective boxing.

it's *dynamic strength*

in LINK-BELT Roller Chain that fights fatigue

ON high-speed drives or heavy conveying jobs, the components of every pitch of roller chain face severe and repeated operating stresses—engagement with sprockets, shock of starting loads, centrifugal loads and others. That's why *dynamic strength*—ability of chain to resist these stresses—is so important. And it's built into *every length* of Link-Belt Precision Steel Roller Chain.

How is dynamic strength developed? In addition to Link-Belt "extras" . . . special design, manufacturing and processing steps provide required properties of uniformity and accuracy for long-life operation.

Talk over your roller chain needs at your nearby Link-Belt office or authorized stock-carrying distributor. Ask for Book 2457, covering this complete line of single and multiple widths, in ¼ to 3-inch standard pitch, 1 to 3-inch double pitch.

14.122

LINK-BELT gives you dynamic strength that comes from these important EXTRAS

PRE-STRESSING of multiple width chain provides uniform load distribution.

SHOT-PEENED ROLLERS have greater fatigue life, added ability to withstand impact.

CLOSER HEAT-TREAT CONTROL —coupled with rigid testing insures uniformity.

LOCK-TYPE BUSHINGS (applied on a range of sizes) end a cause of stiff chain.

LINK-BELT

ROLLER CHAINS & SPROCKETS

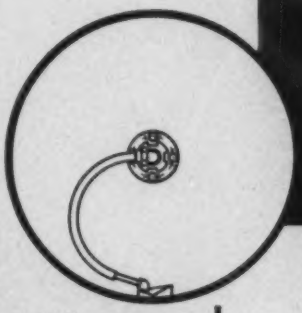
LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

Armstrong Syphon Scoop

provides Superior Dryer Drainage at any Speed

Better Heat Transfer . . .
Less Horsepower . . .
Fewer Repairs

In a 3-hour test on a 60" diameter, 168" face kraft paper dryer operating at 720 fpm, an Armstrong Syphon Scoop removed 110 gallons of condensate, while a stationary syphon removed only 25 gallons from an adjacent dryer closer to the wet end.



Obviously the 85 gallons of condensate remaining in the poorly drained dryer had no beneficial effect on heat transfer and greatly increased the horsepower to drive it. Cascading water in dryers is also a common source of breakage of stationary syphon pipes.

This field test confirms observations made in an open end test dryer in the Armstrong laboratory, as shown in the table below.

PERFORMANCE COMPARISON—Dryer Drainage Devices*			
	Slow Speed up to 500 fpm	Medium Speed up to 900 fpm	High Speed over 900 fpm
Stationary Syphon	GOOD	POOR	POOR
Spiral Revolving Scoop	GOOD	POOR	POOR
Revolving Syphon	POOR	FAIR	POOR
Armstrong Syphon Scoop	GOOD	GOOD	GOOD

**NOTE: Speeds shown are approximate and results would vary depending on dryer and rate of condensation.*

Ordinary drainage devices permit a rim of water to build up to a depth of as much as ½" around the inside of a dryer shell. With an Armstrong Syphon Scoop the rim of condensate cannot exceed 1/16" in depth. And, at speeds below rimming, the generous scoop removes condensate as fast as it accumulates in the bottom of the dryer. As a result, heat transfer is not impaired, horsepower requirements are reduced and there is no maintenance problem.

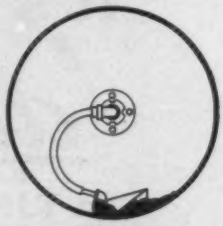
For complete information on how to improve dryer drainage, write to Armstrong today.

NEW . . . BULLETIN FREE ON REQUEST

Bulletin No. 350 gives complete details of the Armstrong Syphon Scoop, describes performance on test dryer, gives physical dimensions and capacities, describes principle of operation and contains list of satisfied users. Send for yours today.

● View of Armstrong Revolving Syphon Scoop in open test dryer at Armstrong Laboratory. Photo taken at 1/1000 second. Water is supplied to dryer through pipe shown. Performance of Syphon Scoop can be observed at all speeds.

Drawing at left shows correct proportion of Syphon Scoop to 5 ft. dryer.



● **SLOW**—view into test dryer operating at 240 fpm with Armstrong Syphon Scoop, starting with pool of water at bottom. Water input rate is 2370 lbs. per hour. In operation, the Syphon Scoop removes water as fast as it enters test dryer.

● **FASTER**—Speed of the dryer has carried the water up the side, but the Syphon Scoop works just as effectively as if the water were at the bottom. There is no build-up of water load to cause costly increase in drive horsepower required.

● **FASTEST**—water has rimmed completely around inside of dryer. This "skin" of water will never exceed 1/16" thickness because there is a 1/16" restriction between the Syphon Scoop and the dryer shell.

ARMSTRONG MACHINE WORKS

A. D. Schnurr (right), Kalo Brick & Tile Company president and Standard Oil lubrication specialist Roland C. Bleimehl discuss plant lubrication requirements. Providing technical service on lubrication is something for which "Rollie" Bleimehl is well qualified. Rollie is a mechanical engineer with a degree from Iowa State College and a graduate of the Standard Oil Sales Engineering School. He's been an industrial lubrication specialist for 10 years with the Standard Oil Company. Customers find his experience and training pay off *for them.*

Large open gear, such as this one in Kalo Brick & Tile plant, suffered excessive gear tooth wear until their Standard Oil man suggested switch to CALUMET Viscous. New lubricant eliminated throw off, reduced gear replacement and maintenance.

CALUMET Viscous Lubricant solves gear lubrication problem for Kalo Brick & Tile Company

Long-time Standard customer receives another demonstration of effectiveness of Standard Oil Products and technical service.

The Kalo Brick & Tile Company, Fort Dodge, Iowa was experiencing trouble with the lubrication of open gears. The lubricant used lacked adhesive qualities and was being thrown off resulting in excessive gear tooth wear. In addition, the lubricant had to be heated before application.

As they had done in so many cases during sixty-five years as a Standard Oil customer, Kalo management called in a Standard industrial lubrication specialist. Inspection and recommendation by the Standard man resulted in a switch to CALUMET Viscous Lubricant for open gears. Kalo Brick & Tile Company got these results: gears received an effective shield that did not throw off, life of gears was lengthened and lubrication maintenance and attention greatly reduced, no preheating of CALUMET Viscous Lubricant was required so this messy job and the preheating equipment were eliminated.

No matter what the problem, chances are Standard Oil lubricants and technical service can help you solve it. Try them. Call your nearby Standard Oil lubrication specialist in any of the 15 Midwest and Rocky Mountain states. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

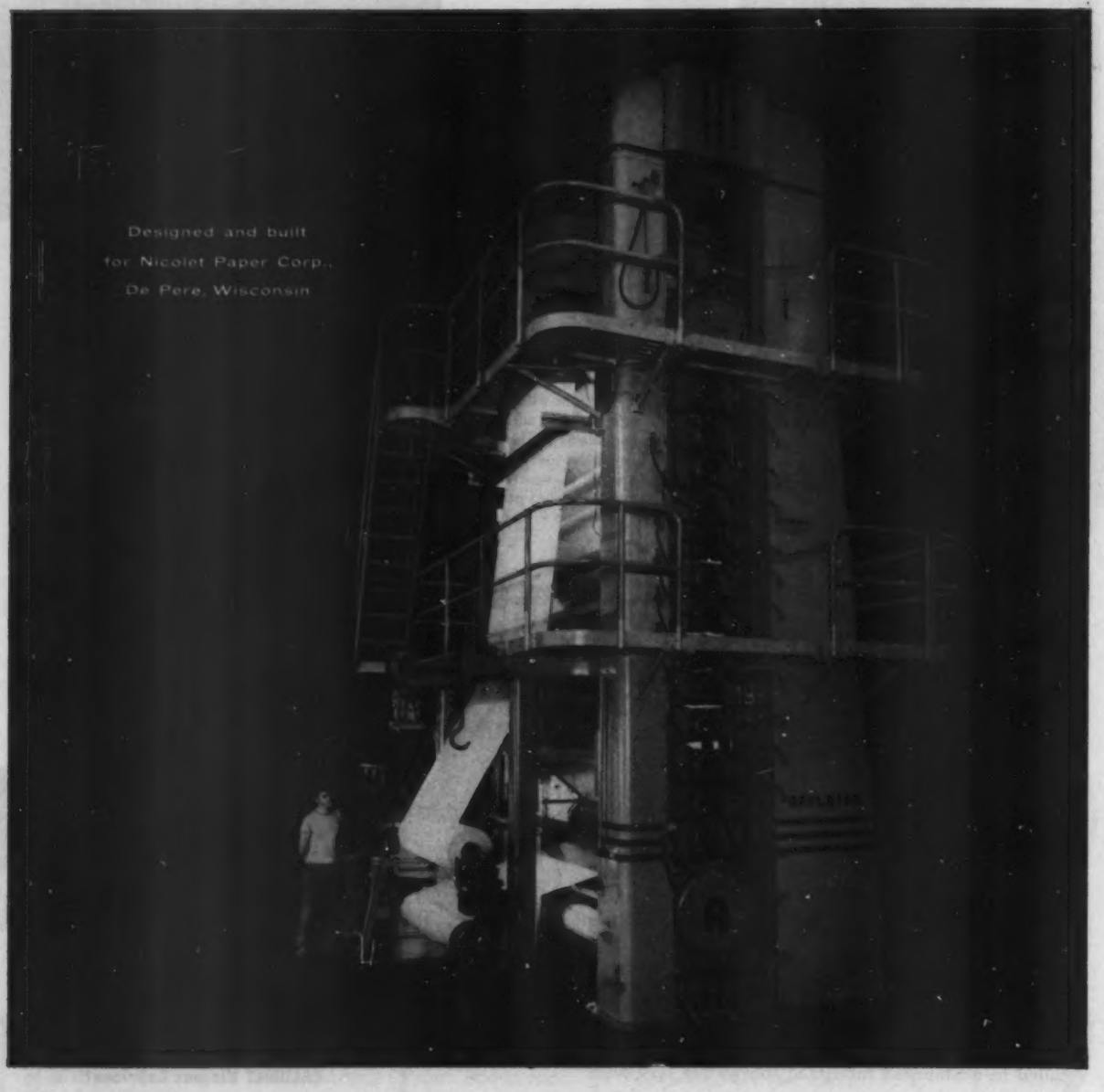
Kalo Brick & Tile Company plant, Fort Dodge, Iowa found solution to gear lubrication problem by using CALUMET Viscous Lubricant.

Quick facts about
CALUMET Viscous Lubricant

- **Not a residual product but a true grease carefully manufactured from selected soaps, oils and additives.**
- **Good wetting ability. Gives lubricant superior adhesiveness, makes it resistant to washing.**
- **Has very high load-carrying capacity. CALUMET Viscous grease formula is especially designed to provide effective shield under heavy load.**
- **Resistance to heat. Since it is a true grease compound, CALUMET Viscous has extreme stability, does not thin out under high heat.**

STANDARD

STANDARD OIL COMPANY
(Indiana)



A reputation for leadership

Skill and experience have earned APPLETON MACHINE COMPANY the reputation for *leadership* with the pulp and paper industry. That's why APPLETON was chosen to build this 16 roll, 84" supercalender that sets the pace for glassine production efficiency.

This high-pressure glassine stack combines functional beauty with rugged strength and advanced mechanical design . . . and like all other APPLETON products, it was *custom-built* for the specific job and installation.

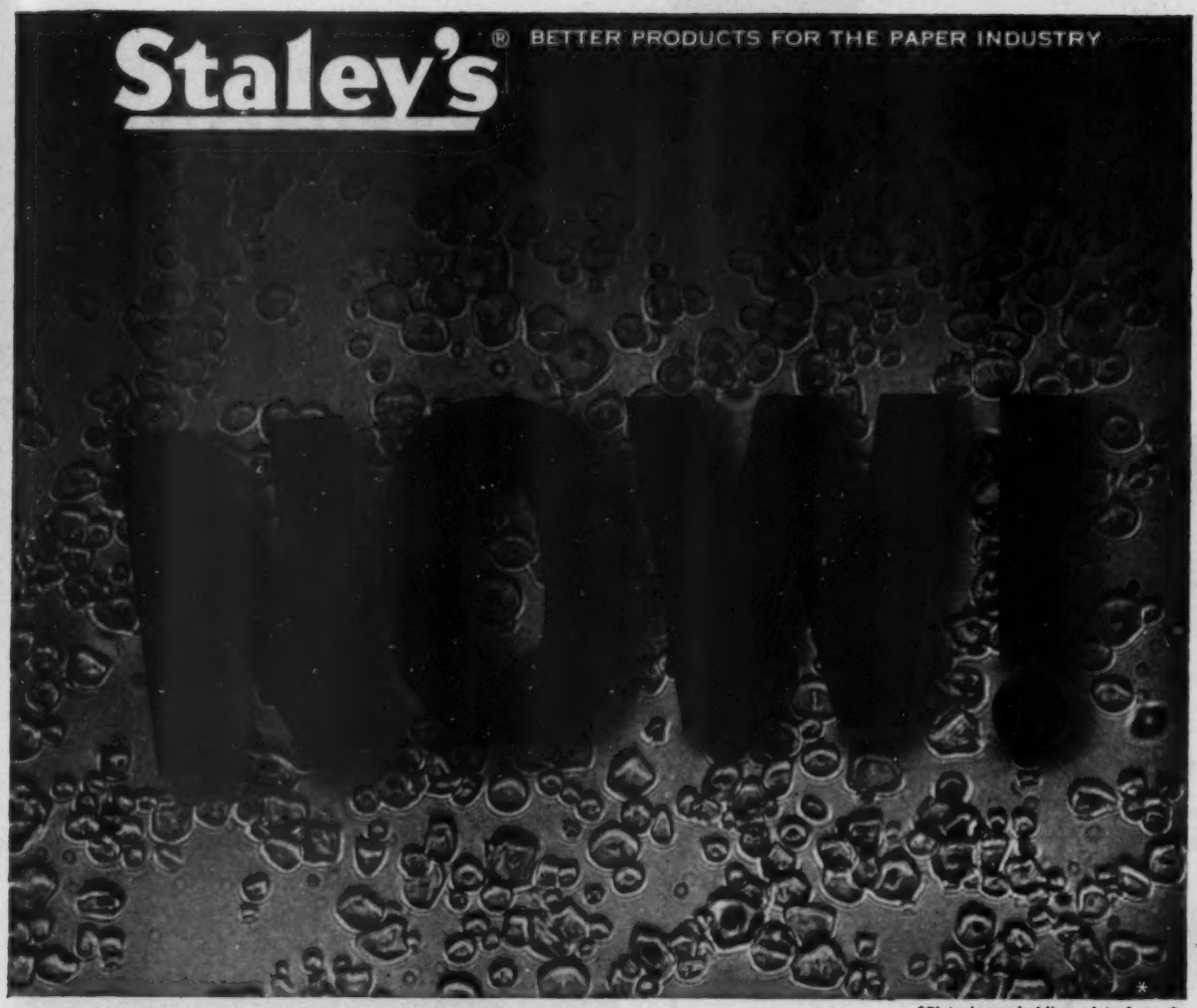
Let an APPLETON representative help *you!* He has an unmatched record of problem-solving.

APPLETON MACHINE COMPANY

APPLETON, WISCONSIN

Staley's®

BETTER PRODUCTS FOR THE PAPER INDUSTRY



*Photomicrograph of dispersed starch granules

Staley's offers the paper industry a *complete* line of Starches, Gums and Dextrins

NEW! STACOLLOID® Gums—A brand new family of starches . . . exceptional non-congealing properties, outstanding viscosity stability, excellent film-forming properties and clarity of solution. Available in a complete range of viscosities at different levels of chemical substitution.

NEW! ETHYLEX Gums—Etherified starches in a wide range of viscosities at various levels of chemical substitution . . . non-congealing, stable viscosity, excellent film-forming properties, clear cooking solutions with minimum tendency to retrograde on cooling.

NEW! STADEX® Dextrins—White, Canary, and British Gums—tailor-made for exacting requirements. A new concept in degree of uniformity and minimum color.

STAYCO® Starches—Custom manufactured, oxidized starches that cook to highly dispersed, colloidal solutions, make exceptionally strong binders, and have superior film-forming characteristics. Available in five viscosities to meet all requirements.

STAZYME® Starch—Uniform product manufactured under close control specifically for enzyme converting.

General—And also a wide variety of unmodified starches, bag-pasting adhesives, laminating adhesives, and starches for specialty applications.

50th ANNIVERSARY YEAR

PRODUCTS FROM CORN Staley's AND SOYBEANS

QUALITY PAPER PRODUCTS

Coating Starches and Dextrins
Beater Starches
Calender Starches
Specialty Gums

A. E. Staley Mfg. Co., Decatur, Illinois

Branch Offices: Atlanta • Boston • Chicago • Cleveland • Kansas City • New York • Philadelphia • San Francisco • St. Louis

How the Hurletron

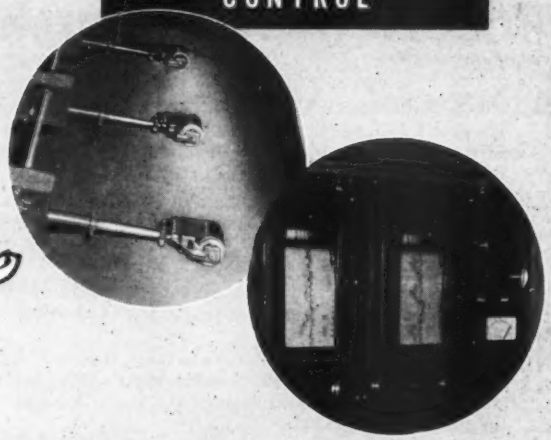
CORRECTS OVERWEIGHT TENDENCIES

You can't slip anything over on a Hurletron. It never sleeps. If the flow of stock is a little too strong and the wet sheet heavies up a bit, this sensitive device is instantly alerted. It watches carefully. If the variation is only momentary, nothing happens. But . . . if a trend is established and the overweight condition persists, the stock flow is automatically corrected . . . the sheet is back in caliper. Wet end fluctuations are actually held to plus or minus one point. And the automatic recording chart shows a picture of the entire operation.

Dozens of progressive mills depend upon Hurletrons for quality control . . . as well as for maximum operating economy. For there is a considerable saving in raw stock. There's less waste . . . greater daily tonnage . . . and, of course, a worthwhile saving in labor. No wonder the Hurletron is a profit-maker wherever it's used.

Want details? Write, wire or phone.

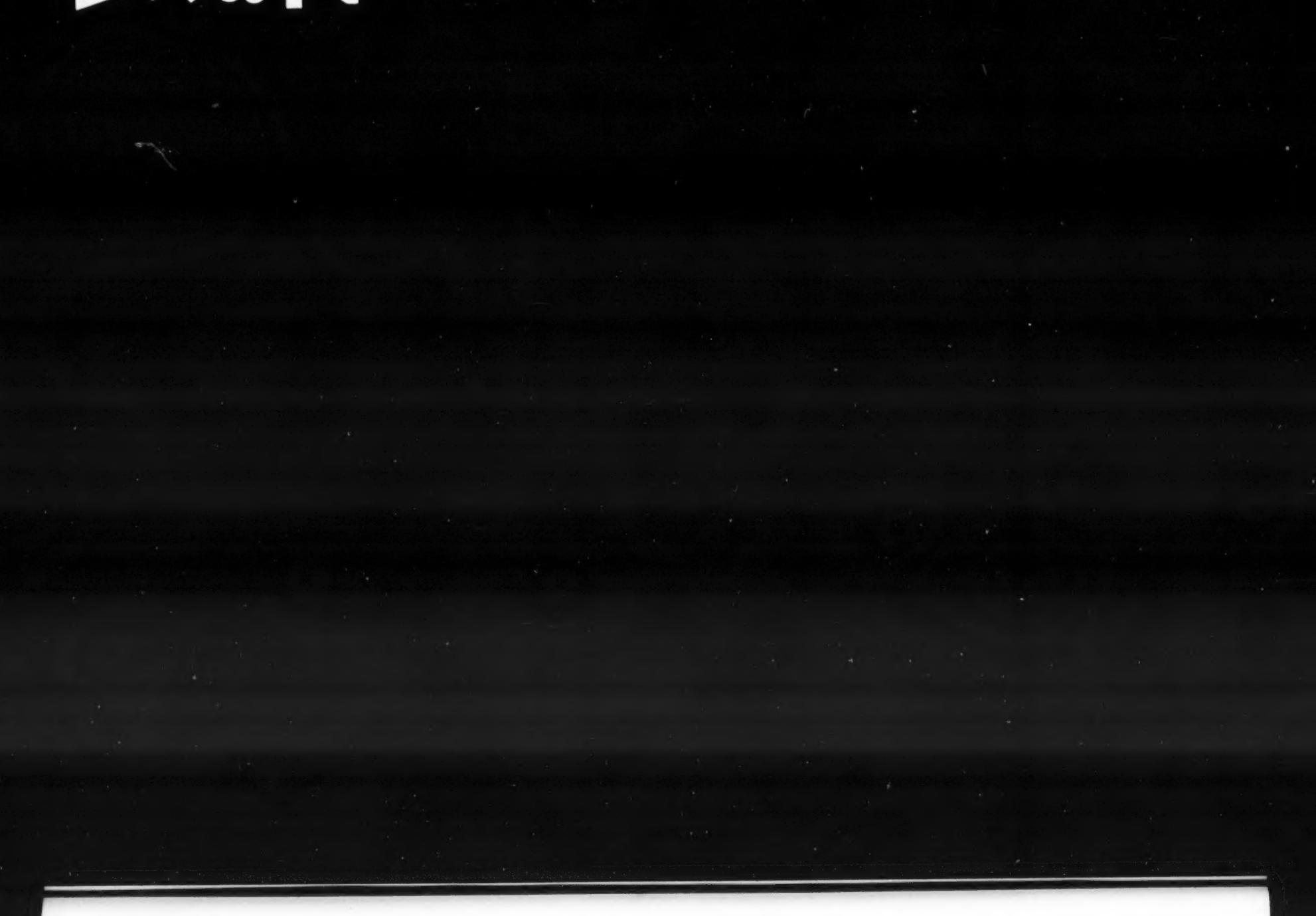
HURLETRON
Automatic
CALIPER and WEIGHT CONTROL

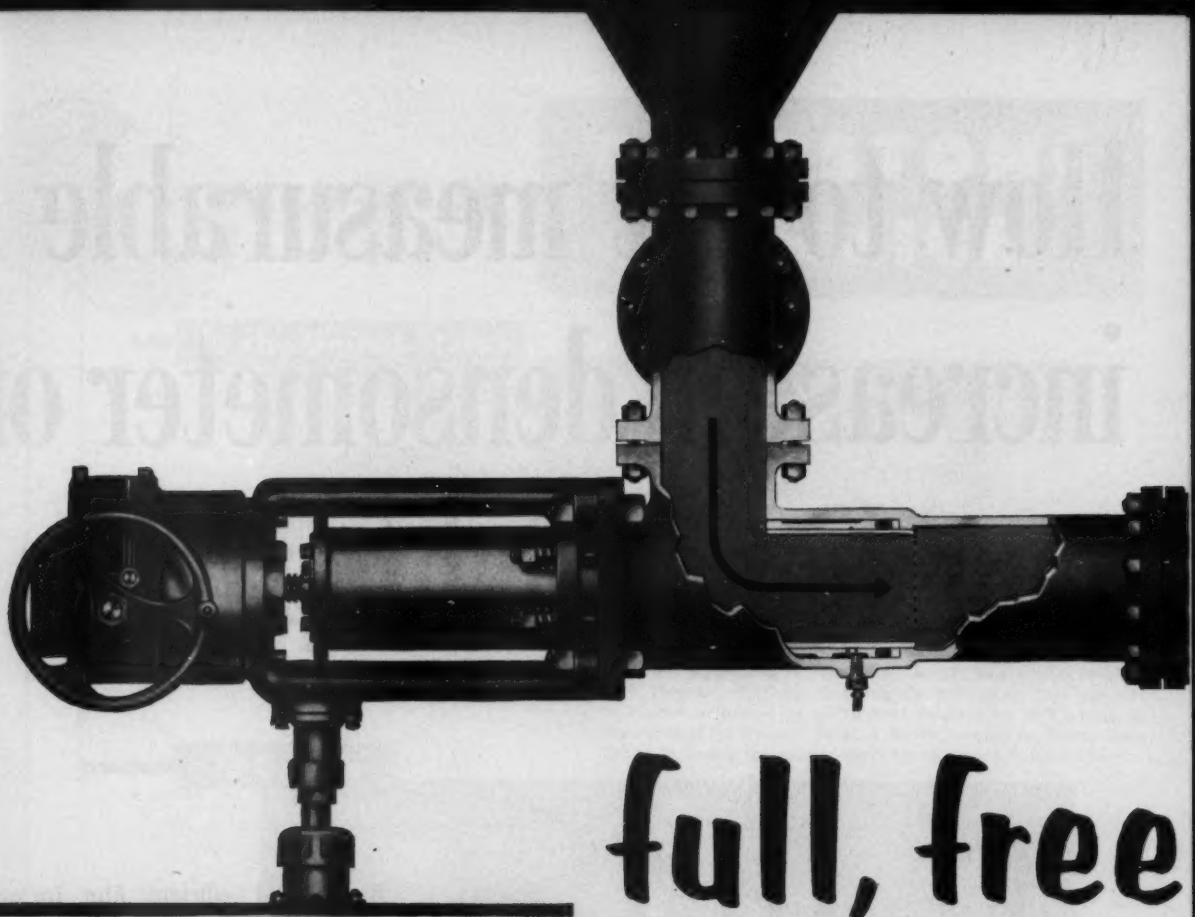


ELECTRIC EYE EQUIPMENT COMPANY

1936 East Fairchild Street • Danville, Illinois

Manufacturers of: Hurletron R.O.P. Color Registration Controls; Automatic Controls of Caliper and Weight on Paper and Board; Center Line and Side Web Guide Controls; Cut-Off and Back-Up Controls; Slitter Controls; Moisture Controls.





full, free digester discharge

HYDRAULIC-OPERATED Yarway Digester Blow Valve—one of six installed at large North Carolina paper mill.

MOTOR-OPERATED Yarway Digester Blow Valve—one of eight installed at large Canadian paper mill.

Digesters blow fast and clean with YARWAY Seatless Blow Valves.

The hollow sliding plunger of the valve has no pockets where wood chips or tramp materials can hang up.

Full pipe area permits fast discharge with minimum pressure drop.

Scores of pulp mills report *lower operating costs* and *increased production* due to YARWAY Digester Blow Valves. One large mill found *savings in operation and maintenance the first year more than paid the cost of their 4 new Digester Valves!*

YARWAY Seatless Digester Valves can be furnished either with electric motor or hydraulic cylinder units. Both are remote controlled. Bulletin B-441 gives the whole story. Write for it.

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149 Mermaid Avenue, Philadelphia 19, Pa.

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·· DIGESTER BLOW VALVES

How to get measurable increase in densometer of your lightweight papers

Remarkably efficient film formers, Kelco's unique sodium alginates, applied at size press, lay continuous films of controllable penetration. This effectively closes up lightweight sheets, measurably raises their densometer test, improves printability, uniformity and smoothness.

Completely non-tacky, the Kelgins and Kelsize S appreciably improve machine operation and reduce "set-asides" caused by picking on the driers and calender rolls. You produce higher quality lightweight papers at faster machine speeds than ever before. If you make lightweights, the Kelgins and Kelsize S, test-proven for easy operation and high quality production, are worth your quick consideration.

YOURS ON REQUEST: Free Sample of the Kelgins and Kelsize S, *plus* new Surface Sizing Technical Bulletin. Without obligation, write today to your nearest Kelco regional office.

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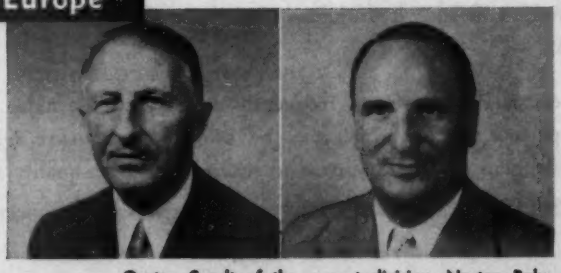
In the United States

J. H. (Jim) Perry, Pulpstone Sales Engineer, is at the service of the pulp and paper industry throughout the United States to prescribe the right pulpstones to meet their exact requirements. Walter Beth, Pulpstone Engineer, is constantly working on improvements in Norton pulpstone design to even better meet and anticipate the needs of the industry. Ralph A. Bohlin is in the Worcester Sales Office to assure the proper handling of your pulpstone orders.

In Canada

W. H. (Bill) Copeland, Pulpstone Technician at Norton Company of Canada Ltd., serves the mills from British Columbia to Newfoundland in the selection of the correct stone specifications to meet their needs. D. B. Annan, Plant Engineer at Hamilton, is in charge of pulpstone development and manufacture in Canada. Miss Lillian Ellis of the Sales Department has charge of order service for the Canadian pulp and paper industry.

In Europe



Gustav Sundt of the export division, Norton Behr-Manning Overseas Inc., is located at Oslo and is in charge of engineering and sales for the many users of Norton pulpstones in the Scandinavian countries. J. S. Michel Biscayart with headquarters in Paris serves pulpstone users throughout central and southern Europe.

NORTON PULPSTONES

NORTON COMPANY, Worcester, Mass.
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EXPORT: NORTON BEHR-MANNING OVERSEAS INC., Worcester, Mass.

Good Film-Forming Means

Enzyme Converted Corn Starch **Penford Gum 380**

One of PENFORD GUM'S many advantages for surface sizing is its ability to give paper continuous, clear films *on* the sheet. As a result of using PENFORD GUMS, you'll find your paper to be more resistant to grease, wax, varnish, lacquer, etc. Furthermore, you'll discover that the rate of penetration of such hydrophilic substances as animal glue and coatings is substantially decreased.

The greater effectiveness of Penford Gums frequently makes their use more economical than that of ordinary corn or root starches which may be offered at a lower UNIT price. Our paper specialists will be glad to advise you as to where these high-quality starch ethers can best be applied to your paper-making operations.

Write us today.

PENICK & FORD, LTD.

Impco Open Cylinder Deckers at Brown Company

These 48″ x 144″ open cylinder couch roll deckers are handling 450 tons daily of unbleached sulfite pulp.

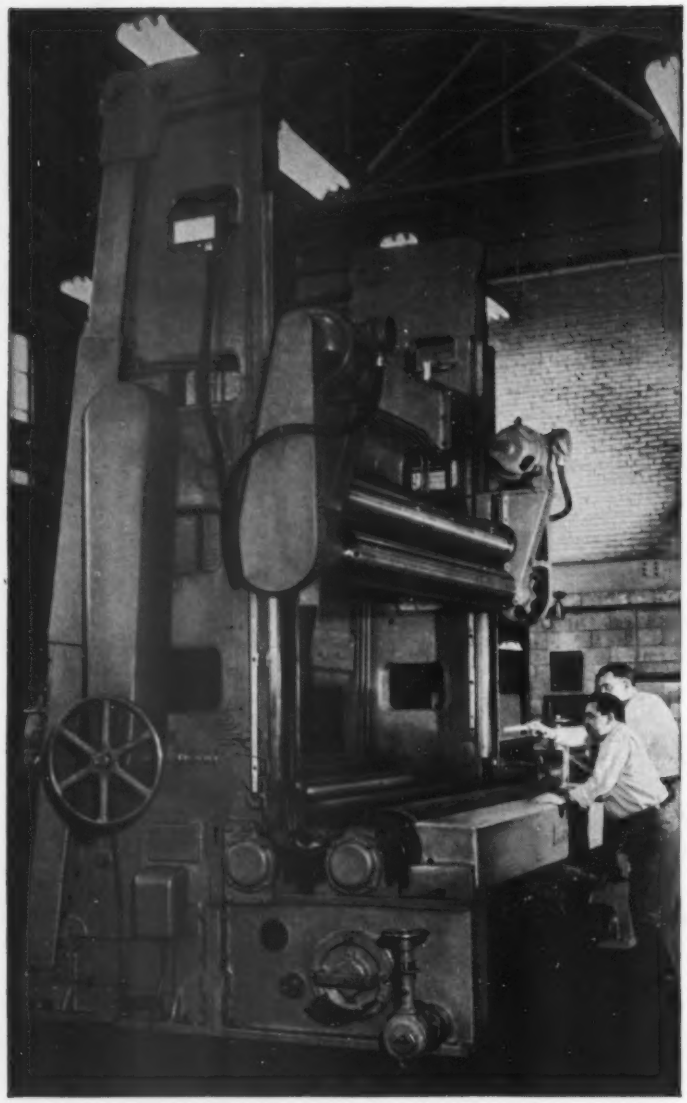
These units at Berlin are of all type #316 stainless steel, utilizing the original Sherbrooke design of perforated deck construction.

High unit capacity as well as quality pulps are primary demands in Brown's modernization program.

IMPCO®

IMPROVED
MACHINERY INC.
NASHUA, NEW HAMPSHIRE

Sherbrooke Machineries Limited, Sherbrooke, Quebec, manufacture similar equipment in Canada.



Standard design **Langston Slitters & Winders** adapt easily for special application

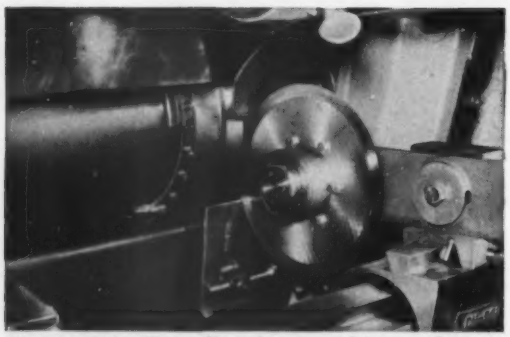
Here's a Langston Slitter & Winder recently installed at the St. Regis Paper Co. mill at Pensacola, Fla., to wind extremely heavy board. The maximum trim is only 92 in., but the weight of the board and the diameter of the rewound roll demanded a machine of unusual stamina.

The machine indicated was the Langston Model DH with certain special features: 18-in. diameter drums and idlers that guard against checking of the heavy board, hydraulic roll ejector, automatically controlled air brakes on main drums and idler rolls.

Density of the roll can be held constant all the way from the beginning of the wind, largely as a result of a newly designed hydraulic control of the pressure roll. Starting at a preset value, rider roll pressure is gradually reduced as the rewound roll builds up in diameter, thus automatically compensating for its increased weight.

Roll density is further controlled by independent, variable-speed motors at each end of the rider roll. D-c ammeters and tachometers indicate rider roll tensioning effort.

Langston Slitters & Winders are available in sizes to 196 in. wide and 72 in. dia. Speeds to 4000 fpm and beyond. Write SAMUEL M. LANGSTON CO., Camden 4, N.J.

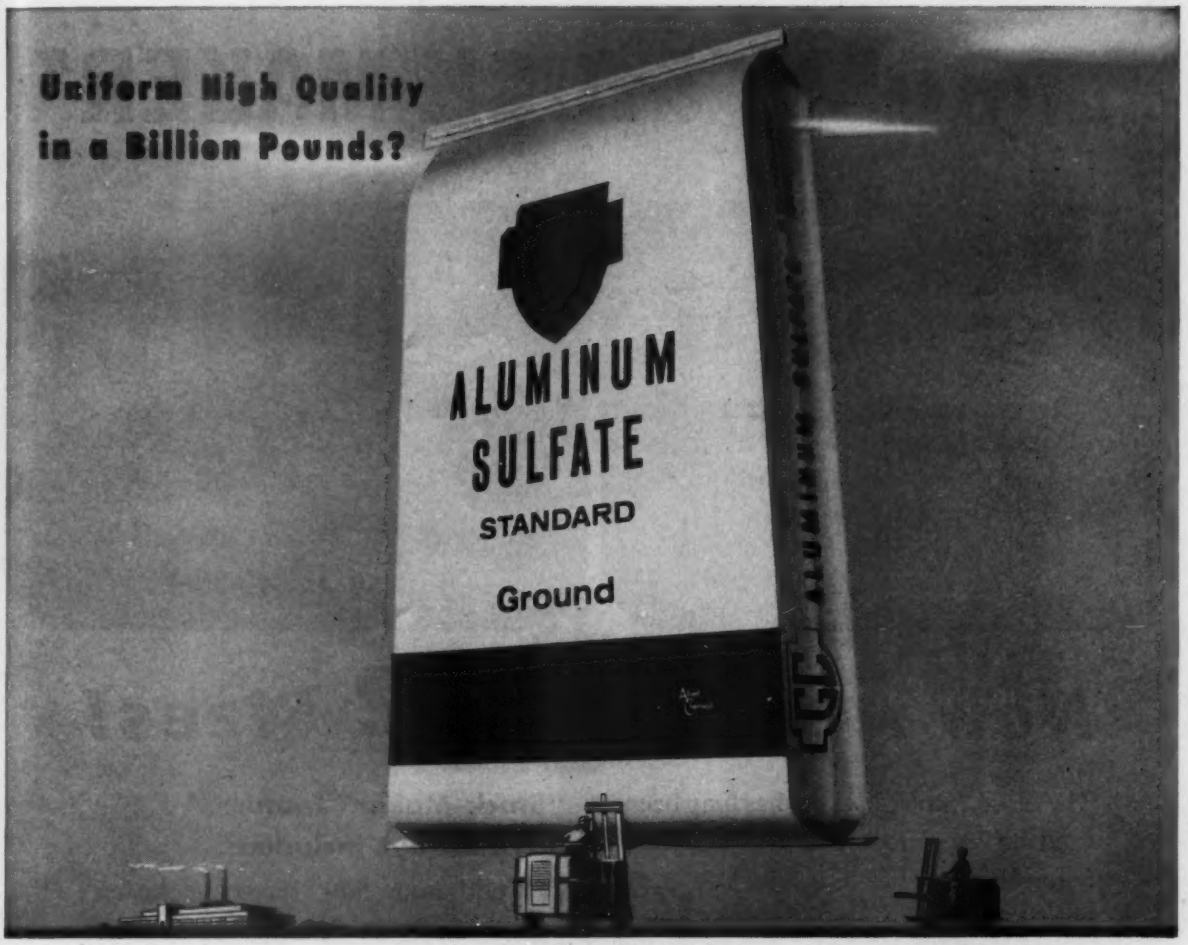


Shear-cut slitter. Rear slitter is power driven and rotates front slitter by friction. Paper passes between and is actually sheared by the action of the two knives. This means cleaner edges, cleaner paper rolls, cleaner plant.

Setting the slitters. Operator has free access to power-driven slitter knives from either rear or front of machine. Here he measures trim slitter for position. Notice also the 18-in. idler roll beneath his hand and the ejector roll hydraulic mechanism over his left shoulder.

LANGSTON *Leadership...by design*

SHEAR CUT CLEAN CUT



Be Sure with High Quality
GENERAL CHEMICAL "ALUM"

The American paper industry now uses Aluminum Sulfate in mountain-size quantities. Consumption has soared to approximately one billion pounds a year. And, every pound used should always be of the same high quality and uniformity if production troubles are to be avoided and an acceptable product assured.

LEADING PAPER MAKERS STANDARDIZE ON GENERAL CHEMICAL ALUMINUM SULFATE

This is one of the many reasons why so many leading paper manufacturers standardize on General Chemical Aluminum Sulfate. They know you pay no premium for the consistent high quality of General Chemical Alum . . . year after year. They know, too, that they can count on General Chemical's experience and multi-plant manufacturing facilities to meet all their needs wherever their pulp and paper mills are located.

Meeting Every Paper Requirement— General Chemical Dry and Liquid Aluminum Sulfate is made in all desired paper-making grades and forms.

Prompt Delivery Everywhere— General Chemical has a coast-to-coast network of 23 Aluminum Sulfate plants plus many more stock points to insure prompt, "on schedule" deliveries.

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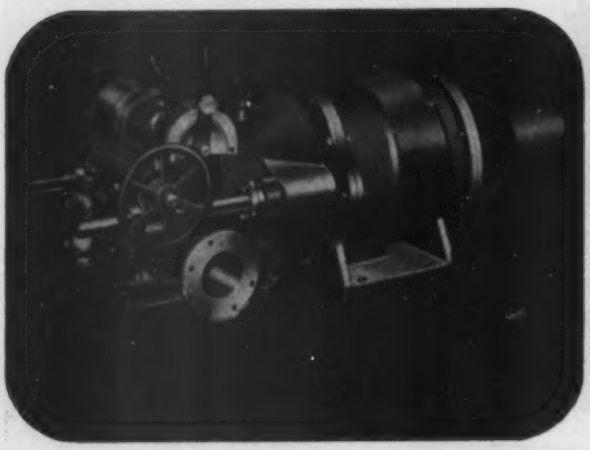
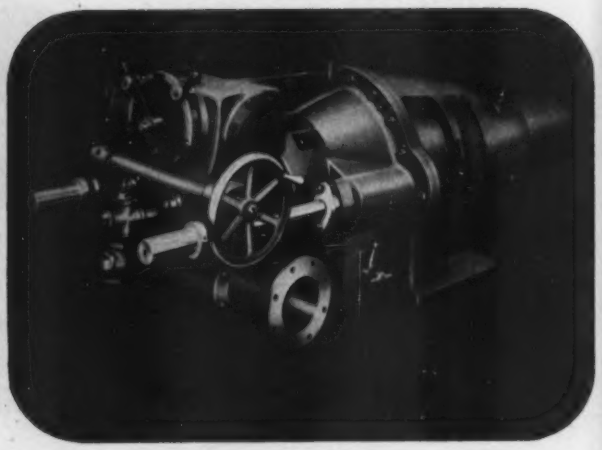
Basic Chemicals for American Industry

MORDEN "STOCK-MAKER"





Now Available in 2 Sizes!

The No. 6 "Stock-Maker" has long been used on small to medium production requirements. The No. 8 "Stock-Maker" now offers the same quality of treatment for larger tonnage applications.

Hundreds of "Stock-Makers" throughout the world are daily proving the efficiency and effectiveness of the "Stock-Maker's" beating-type treatment for maximum fiber development with minimum cutting. The "Stock-Maker" readily handles many variations of treatment on different pulps and grades of paper or board.

"Stock-Maker" features have *always* included:

1. Continuous-flow series operation for direct-to-machine control of production.
2. Closed-system, pump-through operation for pressure treatment.
3. One-piece cast alloy fillings for ruggedness and uniformity.

Investigate how the "Stock-Maker" can help your production!

To Mordenize... Use

- MORDEN SLUSH-MAKER FOR PULPING
- MORDEN STOCK-MAKER FOR BEATING
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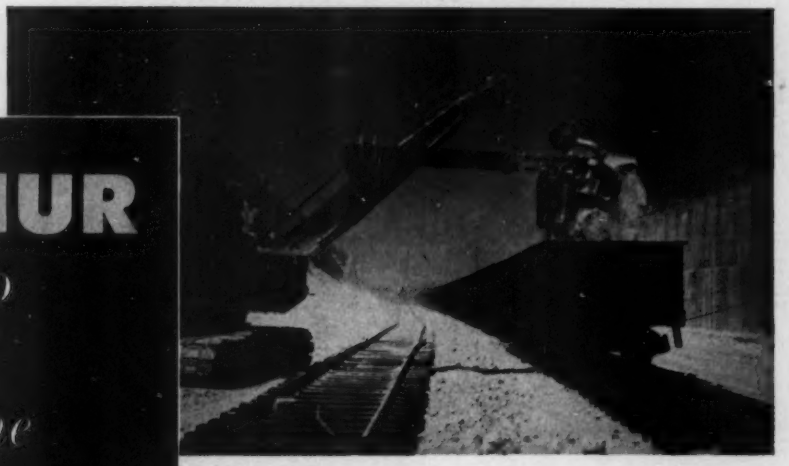
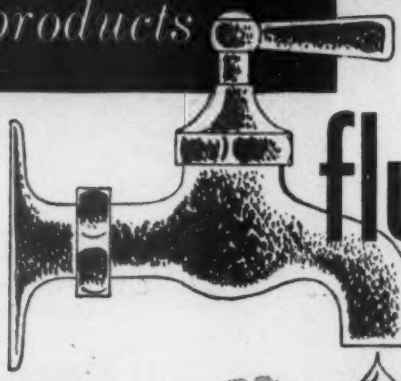
SULPHUR

helps to create headline products





fluoridated WATER

Some communities will, some won't . . . adopt fluoridation of drinking water for the purpose of reducing tooth decay. The subject is hotly debated but one thing is certain: wherever fluoridation is adopted a derivative of Sulphur will enter the picture.

Several chemicals can be used for fluoridation but they all stem from hydrogen fluoride. To produce this gas, a fluoride-bearing mineral is reacted with sulphuric acid.

As today's Headline Products are studied, it's significant that so many require for their production one or more derivatives of Sulphur.

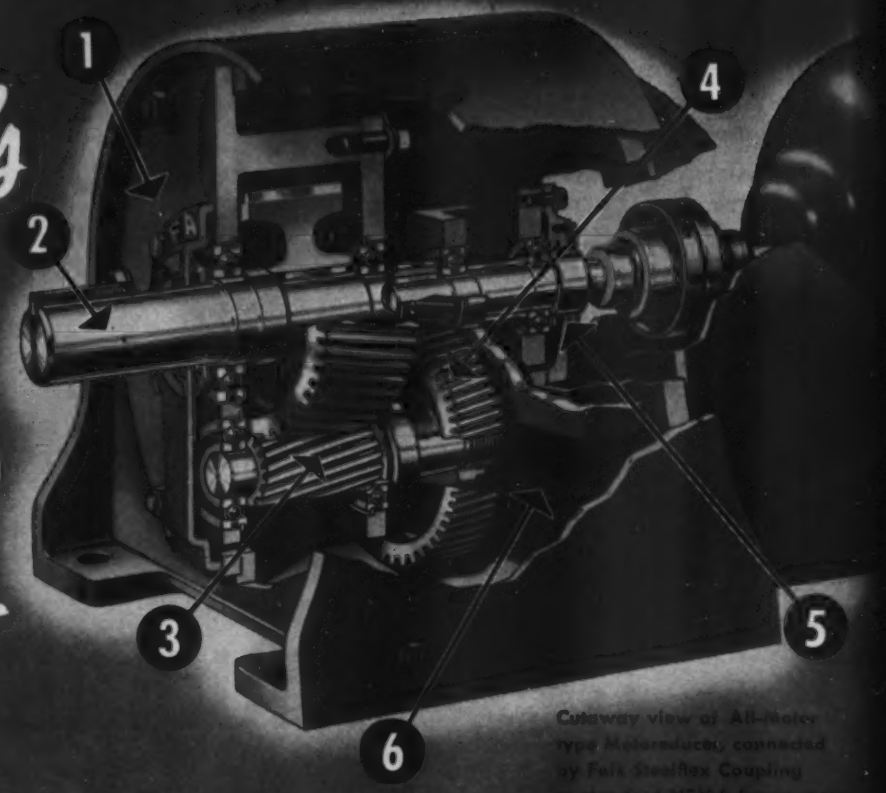
Texas Gulf Sulphur Co.

75 East 45th Street, New York 17, N. Y.

Sulphur Producing Units

• NEWGULF, TEXAS • SPINDLETOP, TEXAS
• MOSS BLUFF, TEXAS • WORLAND, WYOMING

Here's the inside story—



Cutaway view of All-Motor type Motoreducer, connected by Falk Steelflex Coupling to standard NEMA frame motor

WHY Falk Motoreducers give better service—have longer life

Here is the "inside story" behind the all-steel All-Motor type FALK Motoreducer's universal reputation as a gear drive unmatched in quality, efficiency, dependability, ease of maintenance and long life. These "In-built" factors are—

1 **ALL-STEEL HOUSINGS.** Rugged, strong, rigid...all parts are manufactured from heavy steel plate, formed and welded in the Falk Weld Shop.

2 **LARGE OVERHUNG LOAD CAPACITY.** Large shafts, oversize bearings...rigid mountings with wide bearing spans to handle maximum applied loads.

3 **PRECISION GEARING.** Heat-treated alloy steel gearing, precision cut and shaved after heat treatment to eliminate distortion. Quiet, crown-shaved pinions.

4 **EXTRA-CAPACITY GEARING.** Special extra-capacity gear-tooth form with larger contact area gives greater strength, higher load-carrying capacity.

5 **SEALED HOUSINGS.** Splashproof, dustproof, oil-tight construction. Dual closures and one-way vents keep oil in, dust and moisture out.

6 **POSITIVE LUBRICATION.** Large sump capacity...oiltight construction assures clean lubricant...revolving elements lubricated by direct dip.

When you buy or specify the All-Motor type FALK Motoreducer, you get all these—plus the tremendous advantage of full interchangeability of motors. Switch motors as desired—use any make, style or type of standard foot-mounted motor within the unit's AGMA rating—with a minimum of difficulty or "down time."

Available in sizes up to 75 hp—*with or without motor*—from convenient factory, field or distributor stocks, from coast to coast. **Write for Bulletin 3100.**

60,000 HOURS WITHOUT A FAILURE!

Sixty thousand hours is a lot of hours—but the FALK Motoreducer in the unretouched photo above has served that long without failure or need of repair.

This 3 hp unit is one of over 60 FALK Motoreducers in daily service in an Eastern plant of a large milling company, whose president says, in part:

"One of the main advantages of FALK Motoreducers is their adaptability to any motor. Reducers and motors can be easily interchanged....Our service records confirm the wisdom of our choice of FALK equipment as our standard."

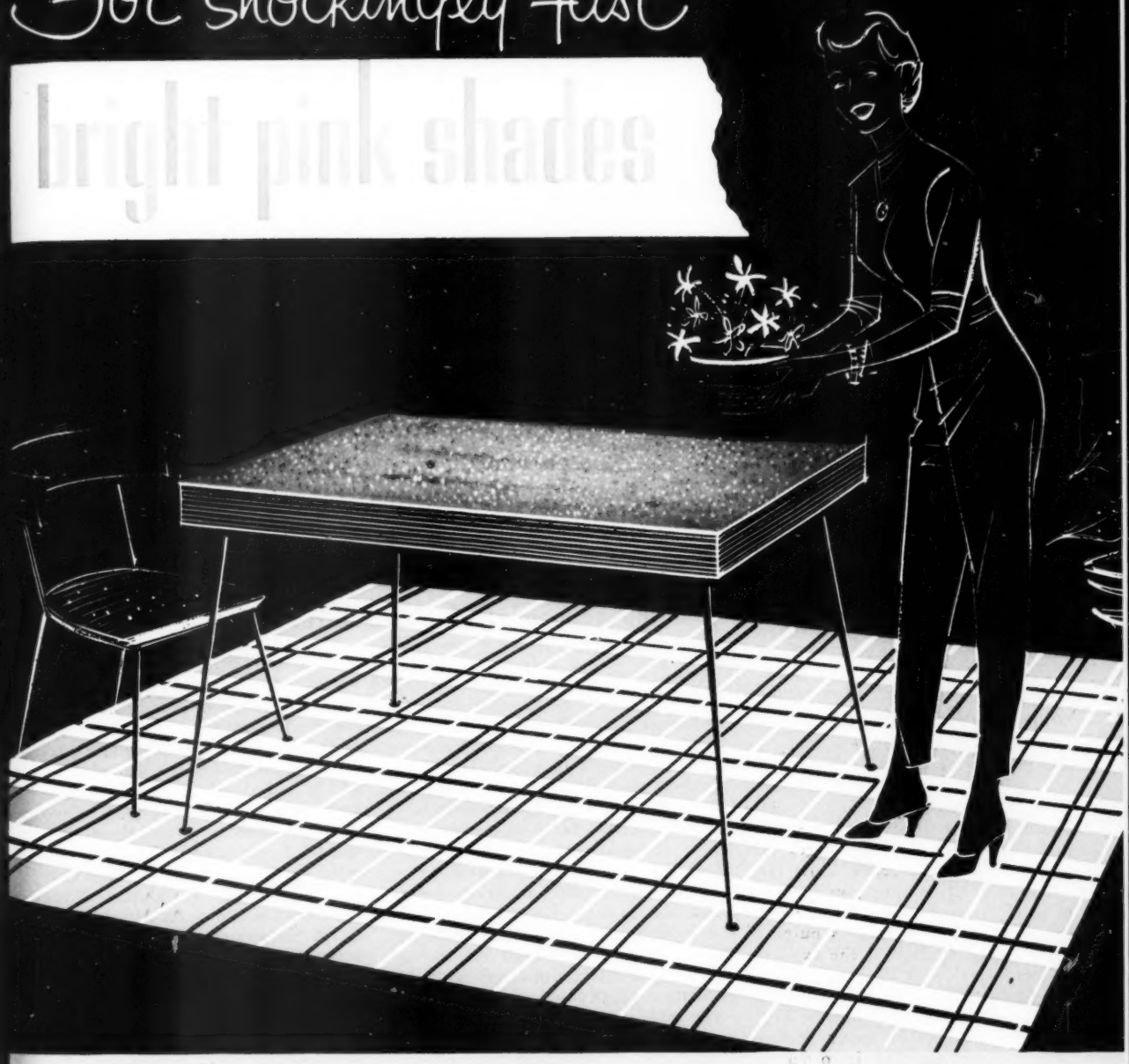
FALK ...a good name in industry

THE FALK CORPORATION, MILWAUKEE, WISCONSIN

MANUFACTURERS OF

- Motoreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
- High Speed Drives
- Special Gear Drives
- Single Helical Gears
- Herringbone Gears
- Marine Drives
- Steel Castings
- Weldments
- Contract Machining

For shockingly fast bright pink shades



PERMANENT CARMINE FR DISPERSED PASTE

Of all the azoic red pigments, this is the fastest to light, maintaining its superior light-fastness even in pale pink shades.

Permanent Carmine FR Dispersed Paste is a non-settling, free-flowing paste, readily dispersible in water.

We strongly recommend this newly developed paste for any type of paper where superior light-fastness is required. It is outstanding for such specialty applications as plastic overlay sheets and twisting tissues.

We invite you to call upon our Technical Service Laboratories and our years of practical mill experience for cooperation on any paper-coloring or paper-matching problem. Let us send you samples and technical data on Permanent Carmine FR Dispersed Paste.

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IN CANADA: CHEMICAL DEVELOPMENTS OF CANADA, LTD., MONTREAL

Effect of variables on pulp analysis and chemical consumption*

MARSHALL E. FINDLEY**
and W. J. NOLAN†

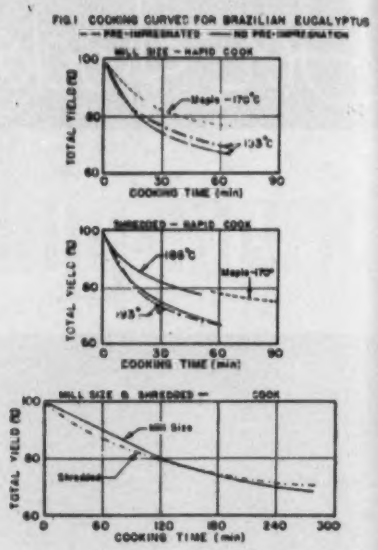


FIG. 1 COOKING CURVES FOR BRAZILIAN EUCALYPTUS
— — PRE-IMPREGNATED —— NO PRE-IMPREGNATION
MILL SIZE – RAPID COOK
TOTAL YIELD %
COOKING TIME (min)
SHREDDED – RAPID COOK
MILL SIZE & SHREDDED – COOK
Mill Size
Shredded

▶ Slow, batch-wise pulping results in somewhat lower lignin content and higher pentosan content. To approach quality and yield of batch-type pulps, chips should be either shredded or pre-impregnated for continuous pulping

▶ If the economics of chemical recovery permits, initial concentration of sodium sulfite, expressed as sodium oxide, should be 20 g. per liter or less

WITH THE INCREASING interest in both neutral sulfite semichemical pulping and continuous digesting methods, it becomes necessary to determine the optimum combination of conditions in order to properly utilize the advantages inherent in these processes. However, the high reaction speed, uniformity of product and high production rate characteristic of continuous pulping must not be realized at the expense of yield, quality or increased chemical consumption. It is particularly important that cooking time be kept at the lowest value commensurate with efficient pulping in order to obtain the most efficient utilization of the expensive equipment involved.

While the factors which increase cooking rates are fairly well established, the effects of changes in these variables on pulp properties have not been satisfactorily determined. This is particularly true in the ranges which are advantageous to continuous pulping. The vast majority of the technical data in the literature has been obtained under mild conditions involving long impregnation and cooking times. Little information is available on conditions necessary for high-speed, continuous operation.

Red maple and Brazilian eucalyptus were studied, using green and air-dry chips, both mill size and shredded. In most of the red maple cooks, temperature and concentration were maintained substantially constant throughout each cook. In the eucalyptus studies, temperature was held constant in the continuous type cooks, but concentration was allowed to decrease in the conventional manner.

This study is limited to the effects of the variables on the chemical analyses of pulps. While this does not constitute a complete study of the pulping reaction, a knowledge of these effects may reduce the experimental work necessary for the evaluation of defibering, physical strength and bleachability.

Experimental procedure

The red maple logs were cut in the Gainesville, Fla. area, while the eucalyptus logs were received from Melhoramentos Co. of Sao Paulo, Brazil. The maple logs were hand peeled in the laboratory. The previously peeled eucalyptus logs, which had dried out in shipment, were submerged in water for two days in order to return them to a simulated green condition. All logs were chipped in the 10-knife Carthage chipper at the Palatka mill of the Hudson Pulp & Paper Corp. Chips were screened, the fraction between 1- by 1½-in. and ½-in. screens being used in the study.

Chemical analyses of the O.D. woods are as follows:

	Red Maple (%)	Eucalyptus (%)
Hot water soluble	3.0	3.8
Alcohol-benzene soluble	2.0	1.4
Lignin	21.7	23.0
Holocellulose	79.7	70.1
Pentosan	17.0	12.9
Alpha Cellulose	49.1	46.8

Some of the chips of each species were shredded or "uniformated" in the Jackson & Church 015 Rotapulper while still in the green or moist condition. Plate clearance was 0.750 in. for the maple chips, 0.995 in. for eucalyptus. The screen analysis of the shredded chips, carried out on a Tyler Ro-tap shaker, was as follows:

*Presented at the 37th annual meeting of the American Pulp and Paper Mill Superintendents Association, June 12-14, 1956, Lake Placid, N. Y.

**E. I. duPont de Nemours & Co., Film Dept., Old Hickory, Tenn.
†Professor of Chemical Engineering, University of Florida, Gainesville.

FIG. 2 LIGNIN REMOVAL — MAPLE PULPS

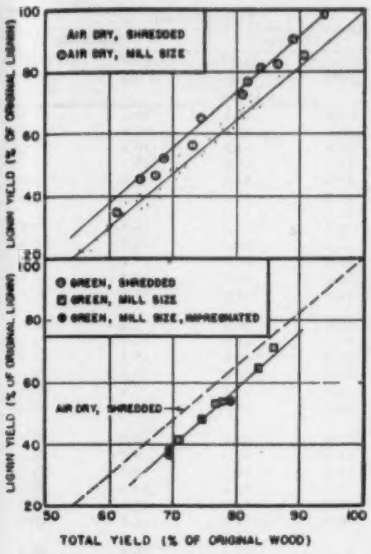


FIG. 3 LIGNIN REMOVAL — EUCALYPTUS PULPS

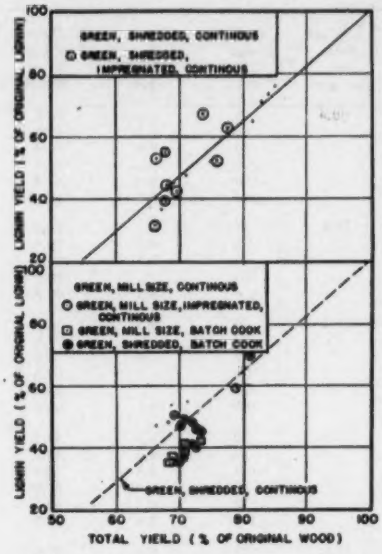
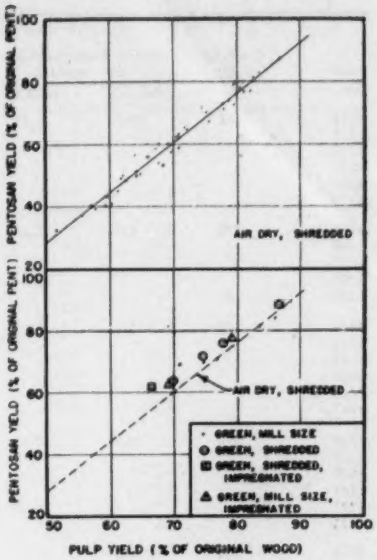

GREEN, SHREDDED, CONTINOUS
GREEN, SHREDDED, IMPREGNATED, CONTINOUS
GREEN, MILL SIZE, CONTINOUS
GREEN, MILL SIZE, IMPREGNATED, CONTINOUS
GREEN, MILL SIZE, BATCH COOK
GREEN, SHREDDED, BATCH COOK
GREEN, SHREDDED, CONTINOUS
LIGNIN YIELD (% OF ORIGINAL LIGNIN)
TOTAL YIELD (% OF ORIGINAL WOOD)

FIG 4 PENTOSAN REMOVAL — MAPLE PULP



Screen size (openings per in.)	+2	−2 +3	−3 +4	−4 +8	−8 +10	−10 +16	−16
Maple	13.0	29.0	25.6	21.6	4.6	3.5	2.4
Eucalyptus	5.1	20.2	28.2	33.9	6.3	3.7	2.4

All screen fractions larger than 10 mesh retained the same chip length as the original chips. In the case of the eucalyptus, all shredded material larger than three mesh was returned to the Rotapulper, while the fines smaller than 10 mesh were discarded.

Part of the maple chips, both mill size and shredded, was air-dried before pulping. All eucalyptus cooks were made on moist chips.

All continuous-type cooks were made at constant temperature, using equipment and procedures which have been previously described (1) (2). In these cooks, temperature was held constant by introducing chips and preheated liquor into the preheated digesters. In the maple pulping experiments, concentration was held substantially constant through the use of high-liquor ratios to reduce the effect of chemical consumption. In batch pulping, chips and cold liquor were charged in the cold digesters. Digesters were brought to maximum pressure at a predetermined rate through the use of indirect steam. In all cases, digesters were discharged through a quick opening valve into a cyclone.

Impregnation of maple chips for batch pulping was carried out in the digester as follows: Chips and liquor were charged to the digesters and heated with indirect steam at 212°F. for 30 min. Pressure was then raised to 13 psi in 25 min. and held constant for 60 min. The actual cook was accomplished by increasing the temperature to 170°C. in 15 min. and holding at this temperature for the specified time.

Preimpregnation of the eucalyptus chips was accomplished before charging the digesters. An accurately weighed quantity of chips, sufficient for one cook, was completely submerged in hot cooking liquor in an open container. The mixture was heated to 100°C. and held at this temperature for 5 min. The container was then cooled to 60°C. in 10-15 min., precaution being taken to insure that the chips remained entirely submerged. The impregnated chips were then drained and weighed. From the increase in weight and concentration of impregnation liquor, the necessary amount of additional cooking liquor to be added to the digester was calculated. After this procedure, the preimpregnated chips were usually about 40 per cent O. D.

At the end of each cook, the cooked chips were washed in canvas bags for 4 hrs. or more, depending on chip size, with water at 170°F. This washing procedure was not as efficient as the washing of chemical pulps because of the chip size. However, essentially all of the dissolved solids was removed. The washed chips were sampled for analysis, dried in trays and weighed for yield determination. The analytical samples were air-dried at room temperature, weighed and ground for analysis.

The samples of pulp were analyzed for lignin and pentosan by Tappi Standard Methods. Cooking liquors were analyzed by adding a measured quantity of standard iodine and back titrating with thiosulfate to obtain Na_2SO_3. The liquor was titrated with standard acid to the methyl orange end point and corrected for Na_2SO_3 to obtain Na_2CO_3. Spent liquors were analyzed according to the methods developed at the Forest Products Laboratory (3). Liquor analyses are expressed as gm. per l., calculated as equivalent Na_2O in all cases.

Cooking data and chemical analyses for pulping of red maple are listed in Tables I and II. Table III is a similar listing of the data for eucalyptus. The cooking curves for maple are not reproduced here since they were presented in a preceding publication (2). The average cooking curves for eucalyptus, both continuous and batch, are shown in Fig. 1.

Pulping rates for red maple

The pulping data showed that air-dry chips pulped considerably more rapidly than green chips. For a given set of cooking conditions, about 10 per cent more wood was dissolved at any given cooking time when air-dry wood was used instead of green wood. When air-dry, shredded wood cooked more rapidly than mill size chips early in the

Table I—Cooking Data for Air Dry Shredded Maple

Cook No.	Cooking Temp. °C.	Initial Concentration, gm. Na_2O/L		Liq-Wood Ratio ml. per gm.	Cooking Time min.	Final pH	Pulp Yield % of Wood	Pulp Analysis			
								Lignin		Pentosan	
		Na_2SO_3	Na_2CO_3					% of Pulp	% of Orig. Lignin	% of Pulp	% of Orig. Pent.
1224	162	29.0	7.37	30.4	15	.....	82.5	18.0	68.2	16.7	81.2
1225					30	9.5	79.5	17.0	62.3	17.0	79.4
1226					60	9.4	74.4	15.5	53.5	16.3	71.2
1227					100	.....	70.6	14.1	45.6	15.1	62.4
1228					150	9.4	67.8	13.6	42.3	15.0	60.0
1229					210	9.3	65.0	12.0	36.9	13.6	51.8
1195	170	4.96	1.29	38.8	20	.....	83.1	19.4	75.4	15.5	75.9
1196					40	8.2	79.5	17.4	63.7	15.6	72.9
1197					60	8.5	75.6	16.8	58.6	15.1	67.0
1198					100	.....	69.1	14.2	45.2	14.7	60.0
1200					150	8.4	67.8	12.7	39.6	13.6	54.1
1142	170	15.1	3.75	25.2	10	9.3	86.8	19.6	78.3	17.0	87.0
1143					30	.....	77.8	17.2	61.8	15.9	72.9
1144					60	9.0	71.9	15.0	49.8	15.5	65.3
1145					90	.....	67.3	12.9	40.0	14.9	58.8
1146					120	.....	64.0	11.5	34.1	14.9	56.5
1147					180	9.1	61.8	10.6	29.9	13.7	49.4
1218	170	29.0	7.37	30.9	10	9.4	83.5	17.8	68.7	16.9	82.9
1219					20	9.4	78.7	16.6	60.3	16.0	74.1
1220					40	9.3	72.1	15.2	50.7	15.2	64.7
1221					80	9.4	65.9	13.2	40.1	14.4	55.9
1222					120	9.4	62.2	12.0	34.5	13.6	5.0
1223					180	9.5	59.5	10.6	29.0	12.3	42.9
1168	170	75.0	19.1	25.6	15	9.5	81.0	17.5	65.4	16.8	80.0
1169					30	.....	74.8	15.9	54.8	16.0	70.6
1170					60	.....	69.7	15.1	48.4	14.1	57.6
1171					120	9.5	62.5	13.1	37.8	13.1	48.2
1154	178	15.2	3.76	24.5	10	.....	82.1	18.7	71.0	15.9	77.0
1155					20	.....	76.5	16.3	57.6	14.7	65.9
1156					40	9.2	70.9	14.7	47.9	15.1	62.9
1157					60	.....	66.1	12.2	37.3	14.3	55.9
1158					90	9.1	61.2	10.4	29.0	12.4	44.7
1159					150	9.1	57.0	8.7	23.0	12.1	40.6
1230	178	29.0	7.36	29.8	10	.....	81.1	18.2	68.2	16.1	77.0
1231					30	.....	70.6	15.0	48.8	14.9	61.8
1232					60	9.4	64.3	12.7	37.3	13.5	51.2
1164	178	75.0	19.1	25.3	10	.....	82.2	17.4	65.9	17.1	82.9
1165					20	9.5	75.1	15.5	53.4	15.8	70.0
1166					40	.....	68.4	14.7	46.5	13.2	53.5
1167					90	9.5	60.2	11.0	30.4	11.5	40.6
1148	186	15.2	3.76	24.3	10	.....	80.5	18.2	67.7	16.5	78.2
1149					20	.....	70.9	16.2	53.0	14.1	58.8
1150					40	9.2	64.3	13.1	38.7	13.2	50.0
1151					60	.....	59.4	11.1	30.4	11.6	40.6
1152					90	.....	55.4	8.6	22.1	.....	.....
1153					150	9.4	51.3	6.5	15.7	10.7	32.4
1233	186	29.0	7.37	29.5	10	.....	77.3	17.8	63.6	15.6	71.2
1234					30	9.3	64.8	13.5	40.1	13.2	50.6
1235					60	9.3	57.6	10.0	26.7	11.6	39.4
1236					90	9.4	55.6	8.6	22.1	11.5	37.6

cook, but at yields of about 75 per cent, the curves approximated each other. When green wood was used, shredded and mill size chips appeared to cook at approximately the same rate.

Pulping rates for eucalyptus

In the pulping experiments on eucalyptus, a large number of cooks were duplicated. It was found impossible to exactly duplicate yields for pulps cooked under identical conditions. The curves shown in Fig. 1 represent the average of all cooks. It was found that the maximum deviation of individual cooks from these average curves was 1.5 per cent yield. Repeated checks, using the utmost care in controlling all conditions, indicated that this ±1.5 per cent is about the maximum deviation that can be expected.

Fig. 1 shows that there is negligible difference in over-all pulping rate, whether mill size or shredded chips are used. In rapid, continuous pulping, the cooking curves are almost identical. In the slower batch pulping, Fig. 1 indicates that, in the early stages of the cook, shredded wood dissolves somewhat more rapidly. After 2 hrs. of pulping the rates become practically the same.

Surprisingly enough, the data indicate that, in continuous pulping, preimpregnation of the chips with cooking liquor has little or no effect on the overall pulping rate. In the case of mill size chips, Fig. 1 shows that the yield curve for the preimpregnated chips ranges about 2 per cent higher than for the chips which had not been pretreated. For shredded chips this effect was reversed, to the extent of about 1 per cent difference in yield. It therefore appears that preimpregnation has negligible effect toward increasing the pulping rate.

Unfortunately, no single set of cooking conditions was used in common for both maple and eucalyptus. Consequently, no direct comparison of the pulping rates of the two woods can be made. In Fig. 1, the cooking curve for green maple, both shredded and mill size, at 170°C. is reproduced as a dotted line. The relative position of this line as compared to the continuous cooking curves for eucalyptus at 186° and 193°C. indicates that the maple may cook slightly more rapidly than eucalyptus.

Table II—Cooking Data for Maple, Air Dry Mill Chips and Green Chips, Mill Size and Shredded

Cook No.	Condition of chips	Initial Concentration — gm. Na_2O per L. Na_2SO_3	Na_2CO_3	Liq. Wood Ratio ml. per gm.	Cooking Temp. °C.	Cooking Time min.	Pulp Yield % of Wood	Pulp Analysis: Lignin % of Pulp	Lignin % of Orig. Lignin	Pentosan % of Pulp	Pentosan % of Orig. Pent.
1160	Air dry mill size chips	15.0	3.75	10.1	170	10	90.3	20.5	85.2	17.7	94.0
1325		29.5	7.65	29.4	170	5	93.5	22.8	98.2	.....	
1326						15	86.2	20.8	82.5	.....	
1327						30	81.0	19.3	72.8	.....	
1328						60	73.0	16.9	56.7	.....	
1329						90	67.2	15.2	47.0	.....	
1318		29.5	7.65	29.2	178	10	83.7	21.2	81.6	.....	
1319						30	74.5	19.0	65.4	.....	
1320						60	65.0	15.2	45.6	.....	
1321		29.5	7.65	29.0	186	5	88.7	22.0	89.9	.....	
1322						11.5	81.7	20.5	77.0	.....	
1323						30	68.7	16.6	52.5	.....	
1324						60	61.2	12.5	35.0	.....	
1089	Green chips shredded	75.0	17.9	5.1	170	18	.....	18.5		16.3	
						30	.....	17.3		16.9	
1090						60	77.7	15.2	54.4	16.6	75.9
1091						90	74.5	14.3	48.8	16.3	71.8
1092						130	69.6	12.1	38.7	15.5	63.5
1093											
1122	Green chips shredded & impregnated	75.5	19.8	5.0	170	120	66.3	11.5	35.0	15.8	61.8
1094	Mill size green chips	75.0	17.9	5.3	170	20	85.7	18.0	71.0	16.7	84.1
						30	83.4	16.9	65.0	16.6	81.2
1095						60	76.6	15.1	53.4	15.7	70.6
1096						90	74.7	14.1	48.4	16.0	70.0
1097						120	70.8	12.9	41.9	16.7	69.4
1098											
1020	Mill size green chips impregnated	75.0	19.6	5.2	170	30	79.0	15.1	54.8	17.0	78.8
1021						120	69.2	11.8	37.8	15.3	62.4

Lignin removal during pulping

Fig. 2 contains the plots of lignin yield vs. total yield for the conditions studied in the pulping of red maple. Fig. 3 is a similar plot for eucalyptus.

A consideration of the pulping of air-dry chips is, of course, an academic one since commercial chips would not be in this condition. However, it is apparent from the upper half of Fig. 2 that lignin removal is more efficient in air-dry chips when the chips are shredded before pulping. Mill size chips must be cooked to about 10 per cent less total yield than shredded chips for comparable lignin content.

The lower part of the figure indicates that lignin can be removed more efficiently from green wood than from air-dry wood. In cooking to the same lignin yield, about 10 per cent less wood is lost when green chips are used instead of air-dry, shredded chips. However, the conditions under which the cooks were carried out do not indicate whether there are any difference in the efficiency of lignin removal when green chips are shredded instead of mill size or when chips are impregnated before pulping.

The fact that the lignin-yield relationship of all the data for any degree of wood subdivision approximates a straight line is quite interesting when one considers the range of the cooking conditions used. Temperature ranged between 162° and 186°C., while the concentration ranged between 5 and 75 gms. per liter.

In Fig. 3 similar lignin-yield relationships for eucalyptus are shown. In this case, the data have a more practical application since no air-dry chips were used. It would appear from the upper part of Fig. 3 that, when shredded chips are used, preimpregnation of the chips does not improve the efficiency of lignin removal. In fact, three points for preimpregnated chips indicate decreased efficiency. However, these three points were obtained from the same series of cooks, and it was felt at the time the work was done that these points might be in error.

In the lower part of Fig. 3 the lignin-total yield relationship for shredded chips is reproduced as a dotted line and is used as a reference line. It is apparent from the data points that lignin is not as efficiently removed from mill size chips as from shredded chips when continuous pulping is used. If the mill size chips are impregnated with liquor before rapid pulping, the efficiency of lignin removal becomes about the same as for the shredded chips. The data for batch pulping indicate that lignin removal is more efficient for the slow pulping process than for rapid pulping, regardless of chip subdivision. The degree of subdivision in the slow, batch method seems to have no effect on the efficiency of lignin removal.

While considering these lignin-total yield relationships it might be pointed out that the line representing this relationship for green shredded eucalyptus crosses the zero axis for lignin yield at a total yield value of 43 per cent, identical to the value previously found for air dry, shredded maple. This value of 43 per cent will be referred to later under the kinetics of eucalyptus pulping.

Pentosan removal during pulping

The plot of pentosan yield vs. total yield for maple is shown in Fig. 4. A similar plot for eucalyptus pulping is shown in Fig. 5.

Table III—Cooking Data for Green Eucalyptus

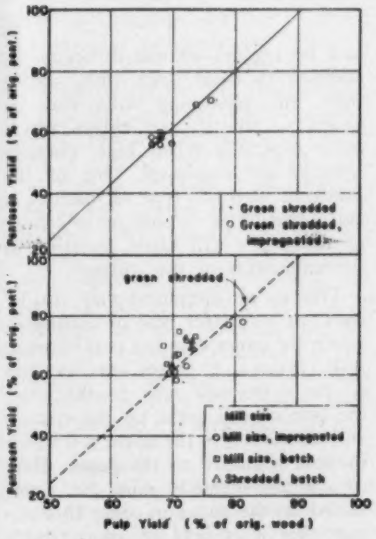
Cook No.	Steam Press. psig.	Cook. Time (min.)	Cooking Liquor: % Wood Basis	Cooking Liquor: Conc. gm. Na_2O per L.	Cooking Liquor: Molal Ratio SO_3:CO_3	Black Liquor: gm. Na_2O per L. as Na_2SO_3	Black Liquor: gm. Na_2O per L. as Na_2CO_3	pH	Analysis of Pulp: % Lignin	Analysis of Pulp: % Pentosan	Total Yield % of Orig. Wood	Lignin Yield % of Orig. Lignin	Pent. Yield % of Orig. Pent.
Shredded chips — −4 +10 Mesh — Constant temperature													
1411	150	7	10.0	20.6	3:1						91.1		
1412		15									87.5		
1413		22						7.3	20.3	14.1	83.9	73.9	91.5
1414		30						7.7			81.2		
1415		40				2.4	0.5	7.1	18.7	13.3	80.2	65.2	82.9
1416	150	7	12.0	20.6	3:1						91.2		
1417		15									85.8		
1418		22						7.7	19.7	12.2	83.0	71.3	78.3
1419		30						7.8			81.3		
1420		40				9.8	4.0	7.9	17.7	12.7	78.1	60.0	76.7
1426	150	7	12.2	21.4	4:1						92.0		
1427		10									87.2		
1428		15				8.2	0.0	7.2	20.8	12.8	85.0	77.0	84.5
1429		20						7.6			82.3		
1430		25				7.8	0.3	7.8	18.3	12.0	81.7	65.2	76.0
1421	180	7	11.8	21.4	4:1						89.4		
1422		15									87.6		
1423		22				7.1		7.7	18.1	12.5	78.2	61.7	79.7
1424		30						8.2	16.4		75.2	53.5	
1425		40				3.5	0.5	8.5	15.0	11.3	72.0	45.6	62.8
1489	180	15	12.6	20.4	4:1						82.0		
1490		22							19.0	11.8	76.8	63.5	70.5
1491		35									71.8		
1492		45				4.2	2.5	8.7	15.2	11.1	69.2	45.6	59.7
1493		60				3.2	2.0	8.7	13.2	11.1	67.3	37.2	58.1
1524	180	7	12.5	35.3	4:1						88.0		
1525		15									81.3		
1526		22									79.0		
1527		35							16.0	11.8	75.0	52.2	68.5
1528		45							13.5	11.6	69.7	40.9	62.8
Shredded chips — −4 +10 Mesh — Liquor impregnated before cooking													
1458	180	7	12.5	19.9	4:1						86.0		
1459		15									78.5		
1460		25							21.0	12.1	73.7	67.4	69.0
1461		35						18.6	11.4	11.4	67.8	54.8	59.7
1462		45						8.8	18.4	11.3	66.5	53.2	58.1
1499	180	15	12.4	20.4	4:1						81.7		
1500		22							18.6		77.6	62.8	
1501		35									71.7		
1502		45				3.0	4.9	8.9	13.4	10.7	67.8	39.4	55.8
1503		60				2.2	2.3	8.9	11.0	10.9	66.5	31.8	55.8
1529	180	15	12.5	20.5	4:1						80.2		
1530		22							15.8	12.0	76.0	52.2	70.5
1531		35									72.7		
1532		45							13.9	10.4	69.7	42.2	56.2
1533		60							15.1	11.0	68.0	44.8	58.1
Mill size chips — Constant temperature													
1431	180	10	12.3	21.0	3:1						88.7		
1432		20									80.3		
1433		30				7.1	1.0	7.9			75.5		
1434		45						8.1	17.9	7.9	71.1	55.2	43.4
1435		60				1.6	0.0	8.2	16.4	5.8	68.2	48.2	30.7
1494	180	15	12.5	20.4	4:1						81.2		
1495		22							23.0	11.8	76.8	76.8	70.5
1496		35									71.7		
1497		45							18.7	9.0	68.8	54.0	48.1
1498		60							16.4	10.2	66.2	47.2	52.7
Mill size chips — Liquor impregnated before cooking													
1504	180	15	12.4	20.4	4:1						84.8		
1505		22							17.4	12.6	78.8	59.6	76.7
1506		35									75.5		
1507		45							15.5	11.1	72.0	48.5	62.8
1508		60							16.9	11.2	69.3	50.9	60.5
1534	180	15	12.8	20.5	4:1						85.0		
1535		22							19.8	12.3	81.3	70.0	77.5
1536		35									75.2		
1537		45							16.1	10.6	70.5	49.3	58.1
1538		60							15.6	11.2	70.2	47.8	61.2
Shredded chips — −4 +10 Mesh — Batch cook, 1 hr. to 115 p.s.i.													
1478	115	60	14.0	19.8	4:1						87.2		
1479		120									79.7		
1480		163									76.8		
1481									14.7	12.4	73.0	46.7	71.3
1482									13.1	12.9	72.2	41.1	72.1
1483									12.3	12.2	70.4	37.7	66.7
1509	115	120	14.0	20.4	4:1						80.5		
1510		165									75.5		
1511		210							14.6	12.0	73.2	46.5	68.2
1512		240							13.0	12.3	72.7	40.9	69.2
1513		270				3.8	3.4	8.7	11.9	11.6	69.8	36.1	62.8

Table III (Continued)

Mill size chips — Batch cook — 1 hr. to 115 p.s.i.

1450	115	60	14.0	20.1	4:1					91.8	
1451		120								80.8	
1452		165								75.3	
1453		210						13.4	12.8	73.4	42.6	72.9
1454		240						13.6	12.2	70.7	41.7	66.7
1455		270						12.9	11.9	68.8	37.2	63.6
1514	115	120	14.0	20.4	4:1					79.2		
1515		165								74.8		
1516		210						12.8	12.8	72.0	40.1	71.3
1517		240						12.9	13.5	70.8	39.6	74.4
1518		270			3.3		8.5	12.0	13.2	68.3	35.6	69.8

FIG 5 PENTOSAN REMOVAL – EUCALYPTUS PULPS



The upper half of Fig. 4 shows a straight line relationship between pentosan yield and total yield in pulping air-dry shredded maple. The agreement of this straight line with the data points appears quite good. In the lower half of the figure, this line is reproduced as a dotted line for reference purposes. It appears that most types of green chips, from a pentosan-yield consideration, pulp more efficiently than air-dry shredded chips. That is, in cooking to the same yield, the pulp from green chips will contain more pentosan than the pulp from air-dry shredded chips.

All of the data points for green shredded chips and for impregnated mill chips are definitely above the reference line, indicating a definite, though slight, superiority of these chips in pentosan retention during pulping. In the case of the green, mill size chips, three of the five data points fall along the straight line, indicating questionable superiority of green mill chips over air-dry shredded chips.

The pentosan data for eucalyptus, shown in Fig. 5, show more definitely the changes in efficiency of pentosan retention with chip size. The top half of the figure shows that, in rapid pulping, preimpregnation of shredded chips does not affect the pentosan-yield relationship in the pulping of shredded wood.

The straight line relationship between pentosan and yield for shredded wood is reproduced as a dotted line in the lower half of the figure for reference purposes. The data indicate that, in rapid pulping, more pentosan is lost when mill size chips are pulped instead of shredded chips. When the mill chips are preimpregnated with liquor, the pentosan retention is improved so that it very nearly coincides with the pulps from shredded chips. When the much slower batch cook is used, both mill size and shredded chips will cook to a higher pentosan content than when rapid pulping is used.

In summing up these relationships between chemical analyses of pulps and pulping conditions, the following facts become apparent: Slow batch pulping over a period of 4 hrs. will more effectively remove lignin and retain pentosan than rapid continuous pulping in the range of 30-60 min. The analysis of these batch pulps does not appear to be affected whether mill size or shredded wood is used. It may be that the batch cook can be shortened through the use of shredded chips, with a reduction in dark chip centers, but the scope of the batch pulping studies was not sufficient to cover such possibilities.

In rapid continuous pulping, shredded chips are definitely superior to mill size chips from a standpoint of lignin removal and pentosan retention. If the mill size chips are well impregnated with liquor before cooking, the efficiency of pulping bocomes about equal to that obtained with shredded chips.

Conclusions

Since pulping conditions are determined to a large extent by the particular products, local economics and plant conditions of the mill involved, it is impossible to make specific recommendations of optimum conditions of cooking which will fit all mills. However, a few general suggestions can be made for NSSC pulping, based on chemical properties and rate considerations.

In cases where cooking rate is not important but pulp quality and maximum yield are paramount, slow, batch type pulping methods appear most appropriate. For a given yield, lignin content will be slightly lower and pentosan content slightly higher than when efficient continuous cooking is employed. Mill size or shredded chips may be used, although there are indications, not presented in this paper, that shredded chips will permit the use of higher temperatures and shorter cooking cycles without sacrifice of either yield or quality.

Where high pulping rates are important, as in continuous pulping, there is considerable advantage to be gained and little, if any, disadvantage in going to temperatures as high as 193°C., provided shredded chips are used. The losses in efficiency of lignin removal and pentosan retention over slow, batch methods are small. It is felt that the improvement in pulp uniformity characteristic of continuous digesters will compensate for the loss in pulping efficiency.

If mill size chips are to be used in continuous digesters, they should be preimpregnated with the maximum amount of liquor before pulping. Under such circumstances, lignin and pentosan analyses will be about the same as when shredded chips are used. Even though preimpregnated the chips should be cooked in the liquid phase, since only part of the necessary chemical at economical concentration can be taken up during impregnation.

If mill size chips are not preimpregnated before continuous pulping, the resultant pulps will be excessively high in lignin and low in pentosan, thus defeating the original purpose of semichemical pulping. Neither yield or pulp quality will be high under such circumstances.

(See August issue for chemical consumption)

General coating methods and drying systems

While Part II—in the June issue—discussed a number of specific on-the-machine coating methods, Part III is a more general discussion of methods that apply to both on-the-machine and off-the-machine processes

IN GENERAL THE PAPER coater or converter will coat either sheets of paper or an entire roll of paper. Coating an entire roll of paper is generally referred to as web coating as opposed to sheet coating.

Sheet coating

This type of coating ordinarily involves the application of organic solutions such as lacquers and varnishes. Consequently, the "on the machine" type of application used with inorganic coatings cannot apply here. Machines for sheet coating ordinarily come equipped with feeders. The feeder consists of a transfer cylinder with synchronized grippers which pick up a sheet from the top of a pile. This sheet is passed on by these grippers to the backing cylinder of the coater. The backing cylinder is also equipped with grippers. In addition to the backing cylinder there are two other rolls, a doctor roll and an applicator roll.

When the backing cylinder receives a sheet of paper, the applicator roll dips into a fountain, takes on the coating and passes it onto the paper. The backing cylinder, of course, is adjacent to the applicator roll and these revolve in opposite directions. They are so arranged that when the backing cylinder receives a sheet of paper the applicator roll is raised and the two-cylinder surfaces meet under pressure and at the same speed. The doctor roll is a small roll adjacent to the applicator roll which removes excess coating from the applicator roll. The machine is also arranged in such a fashion that the applicator roll ceases to operate as soon as the backing roll no longer receives the sheet of paper.

The thickness of the coating is regulated by the viscosity and solids content of the solution, by the clearance between the doctor roll and the applicator roll, and by the hardness of the rolls. In general, thinner films can be laid down by harder rolls. For certain types of jobs, it may be desirable to have an uncoated strip on the sheet. This is especially desirable where subsequent gluing is involved, since most coatings cannot be glued easily with commonly available water base adhesives. In order to obtain an uncoated strip, metal arms are attached which hold a metal strip of the required width. This acts as a doctor on the applicator roll removing all of the coating at the particular point.

Sheet coating machines of this type are available which will coat sheets with dimensions as great as 52 × 78 in., at coating speeds as high as 275 fpm. These machines are always equipped with drying tunnels and these will be discussed in detail later.

The sheet waxer, another type of machine, is used largely for the application of waxes to board. Solvent solutions may also be used on this machine if they have very low viscosities. In this type of machine, the paper board passes between two rolls. The bottom roll obtains coating by dipping into a coating pan. The top roll has coating supplied to it by a pump. Thus, each roll coats one side of the paper, and the excess coating is squeezed off as the paper passes between rolls. The viscosity of the coating here is generally no greater than 100 centipoises and the board is generally no thicker than 0.1 in.

Web coaters

While numerous types of web coaters are available, roll coaters of various types are most commonly used for web coating. Their popularity arises from their versatility and precision. The rolls may be set either in a horizontal or vertical plane.

The roll coater, in its simplest type, consists of two rolls placed vertically. The bottom roll dips into a coating pan and picks up the coating and applies it to the paper as it passes between the two rolls. The thickness of coating is adjusted by the opening between the two rolls. If these rolls are quite hard, as they are if made of metal, coatings of ½ mil thickness may be applied without difficulty. In addition to these main rolls, doctor rolls and smoothing rolls may be added to smooth out ridges which occur especially when high viscosity coatings are employed. One of the problems with this type of machine is that variation in tension or in caliper of the paper will cause variation in the uniformity of the coating.

This set of equipment may also be used for a transfer type of coating in which the paper does not pass between rolls. Instead, it passes over the top of the uppermost roll. In this case, the bottom roll picks up the coating and transfers it to the upper roll which in turn applies it to the paper. Here considerable tension must be maintained on the paper in order to make sure that it is held in contact with the surface of the uppermost roll.

The doctor roll is important, regardless of which way the coating is applied. This roll is smaller in diameter as compared to the two applicator rolls; and it serves to remove the ribbing which results, especially when high viscosity coatings are used. If the doctor roll revolves in a direction opposite to the direction in which the web is traveling, a shearing force is created which reduces the ribbing even more. The doctor roll does not remove any of the coating. It merely serves to "squeeze" the coating so that a smoother, more rib-free coating results. Ribbing can also be reduced by cutting down the solids content of the coating.

With roll coaters placed horizontally, both rolls dip into the fountain or coating pan. The web, however, goes over only one of these rolls. Since both rolls go in the same direction, one roll serves to shear off undesired excess coatings from the surface of the roll which touches the web. The doctor blade or roll serves to remove the coating from the roll which does not touch the web. Since the doctor roll removes the coating from the surface of this roll, this roll has an un-

coated surface which helps to smooth the coating on the second roll. This smoothing is effected prior to the time that the second roll applies the coating to the web. The web subsequently goes around a third roll which is placed a short distance away from the applicator roll. Subsequently, a small doctor roll presses against the coating to cut down on ribbing.

Reverse roll coaters are popular because they can be used for applying solvent solutions, dispersions or emulsions. The coating, however, must have a medium viscosity. Coating weights can be controlled within a range of 1-4 lb. per thousand sq. ft.

A typical reverse roll coater consists of a backing roll over which the paper passes. This backing roll is in contact with a coating roll which dips into the coating solution, picks up the coating and applies it to the paper as it passes around the backing roll. The backing roll serves to press the paper against the face of the casting roll. Next to the casting roll is a small metering roll and the distance between the metering roll and the casting roll determines how much coating is applied to the web. A doctor blade serves to keep the metering roll clean.

Roll coaters are available that will coat both sides of the web. One type is essentially the same as the wax coater described under Sheet Coating. The other consists of a machine in which the paper is dipped under a roll into a pan containing the coating material. Thus, the coating is applied to both sides of the paper. This coated paper is then pulled between two rolls which squeeze off the excess coating. The amount of coating applied is regulated by the distance between two rolls. Doctor blades are used with both of the rolls to keep the surfaces clean. Ordinarily the rolls described above are chilled iron rolls.

The dip coater is the oldest type of machine for coating a web. It makes use of varnishes or emulsions with low solids contents, since improper type of flow is obtained with coatings of high solids content. Because of the low solids content required, the web speed is slow and the drying load is high. The dip coater may coat either one or both sides of the web. It consists primarily of a roll and a coating pan, and the web passes around the roll which dips into the coating. If both sides of the paper are to be coated, the roll is completely inundated in the solution. If only one side is to be coated, the roll is immersed barely beneath the surface of the solution. Although the machine itself is inexpensive, its operation is costly.

An interesting variation of the dip coater, which can be used when only one side of the paper must be coated, involves raising the roll a fraction of an inch above the surface of the coating solution. The paper then passes under the roll between the roll and the solution. If the web has been wetted by the solution, a bubble or bead will be raised between the surface of the solution and the paper. This bubble, because of surface tension effects, is sufficient to coat the paper. The amount of coating applied is controlled by the quantity of stress forces in the bead. These of course depend upon the viscosity of the coating solution and the dimensions of the gap between the paper and the surfare of the solution.

The knife coating principle is employed by a number of web coaters which have been in use for many years. The principle involved here is that a knife serves to scrape off the excess coating which has been applied to the web. At the same time, the knife helps determine the thickness of the coating.

Various procedures have been worked out for bringing the knife into action. One type of coater employs a so-called floating knife. Here the web passes over a roll and underneath a knife which is supported on a mounting. Just before the web reaches the knife, the coating solution is flowed onto it. The knife then scrapes off the excess which runs off the web into a container underneath. Such a device is used largely for coating cloth for artificial leather and silks for shower curtains and similar items. The amount of coating applied depends upon the tension of the web, the angle at which the knife is set, the thickness of the base of the knife, and the relationship of the position of the knife to the roll over which the paper passes.

A second type of knife coater employs a knife directly over a backing roll. Here the web passes over a roll and the knife is directly above this roll. Again the coating is applied just prior to the time that the web reaches the knife. Here the amount of coating applied is determined not only by the viscosity and solids content of the coating solution, but also by the distance which exists between the knife and the backing roll and the hardness of the backing roll. Ordinarily this roll is a composition roll so that it will be resilient and permit the application of a uniform coating. This type of coater is used to coat cloth with rubber solutions or with lacquer. Parchment paper may be coated with a thick coating of gelatin by this procedure.

A third type of knife coater involves the use of a rubber blanket which is mounted over three rolls arranged in the form of a triangle. The blanket then is essentially an endless belt. The paper web comes off an exterior roll and passes over the rubber blanket. A knife is supported above the blanket and again the coating is deposited in front of the knife and the knife scrapes off the excess coating and helps to determine the thickness of the film. The rubber blanket serves to reduce the tension required on the web and at the same time it provides a resilient surface which permits the application of a uniform coating. This type of coater may be used for applying various types of lacquers with high solids contents as well as organosols to paper webs.

A fourth type of knife coater is termed an upside-down knife-roll coater. It bears this designation because the knife scrapes the coating from the under side of the web rather than from the top side. Here a roll is immersed in a coating pan and the paper passes over the top side of this roll and picks up coating which is then metered by a knife placed a short distance away. The web subsequently continues over another roll to the drying ovens. Ordinarily the knife is placed in such a position that the coating pan is under it, so that excess coating falls directly into the pan. This type of coater has been used to coat blueprint paper, artificial leather, and various types of cloth. It can also be used to apply clay coatings and asphalt coatings to paper and paperboard.

In cast coating the paper passes between a roll which dips into a coating pan and a resilient roll. The roll in the coating pan serves to apply the coating to the paper after which the web, coated side down, passes over a huge drum dryer. The drum dryer is heated and the solvents or water in the coating are driven out through the back of the paper. The coated paper is stripped from the surface of the drum after it has dried sufficiently. Obviously, such operation is slow and speeds in excess of 100 fpm are seldom achieved. The net result, however, especially if the drum dryer is carefully ground, plated with nickel or chromium, and polished to a mirror finish, is that the coated surface has a very high gloss

and calendering is not necessary. This type of coating is particularly effective with inorganic coatings to provide very glossy films.

The air-brush coater is an interesting variation in the machine used for web coating. Here, a current of air is used as the metering medium. The web passes over a roll which revolves in a coating pan. This roll applies coating to the under side of the paper. This paper then goes over another roll in such a way that the undercoated side of the paper is next to the roll and the excess coating is blown off by air which comes out of a nozzle under pressure. At the same time, the air smooths the coating which remains on the surface of the web. The thickness of the coating is determined by the pressure of the air, the angle at which the air is applied, and the width of the slot through which the air is applied. The procedure requires paper with a hard surface and may be used either for water dispersions or solvent based coatings.

Spray coating is another type of coating which is utilized with water emulsions or water dispersions. Although the actual machines may be quite complex, the principle involves simply the spraying of the surface of the paper with the coating through a nozzle which atomizes the coating and applies it in a smooth uniform manner. Brush coating is a procedure for applying inorganic coatings to a web. The brush coater has been widely used in the past and is still very prominent today.

Print roll coating

Papers are frequently coated by operations which resemble ordinary printing. Among these are letterpress print coaters, rotogravure print coaters, and offset rotogravure print coaters. The letterpress coater requires a coating varnish with a solids content of 50-65 per cent. The solvents used must be high boiling to prevent the coating from drying out on the roll. On the other hand, the coating must dry rapidly of its own accord since very little heat is available. Usually a very thin coating is applied.

A letterpress print coater consists basically of a roll which revolves in a fountain, a transfer roll, a series of distributing rolls and form rolls and a plate cylinder. A rubber covered roll may be used in place of the plate cylinder. A pressure roll is adjacent to the plate cylinder and the paper passes between the pressure roll and this plate cylinder. The coating is applied by the plate cylinder which in turn has received it from the fountain roll, the distributing and form rolls. The weight of the coating is controlled by the speed of the various rolls and particularly the speed of the fountain roll and the transfer roll.

In the rotogravure process the coating is picked up by an etched roll. The etchings may form a pattern, or else the roll may be completely etched if an overall coating is desired. The excess coating is scraped off the etched roll by a doctor blade and then the etched roll transfer the coating to the paper. This is exactly the same process used in rotogravure printing. Rotogravure-type printing has an advantage in that it can be carried out at very high speeds. The etched rolls are expensive to prepare, but once prepared last for many years. Thus, rotogravure printing is of value where numerous impressions of the same type are to be made. A rotogravure coating solution must be low in viscosity and it must not be thixotropic. It must have the property of entering the indentations in the etched cylinder easily and also coming out of the indentations readily. The weight of the coating depends not only on the viscosity and solids content of the coating solution but also on the depth of the engraving in the etched roll. In a rotogravure press there are normally 4-8 stations and at each station a different color is applied on the paper. Register is maintained by an electronic system. The final station usually applies an overall coating for protective and decorative purposes.

Rotogravure printing tends to provide printed surfaces which show the roll pattern. This can be overcome by so-called offset rotogravure printing. Here, the rotogravure print roller picks up the coating and transfers it to a rubber covered offset roll which in turn transfers the coating to the surface of the paper. This eliminates the pattern which is frequently picked up from the roll in direct gravure printing.

Electrostatic coating

This method, recently developed at the Battelle Memorial Institute, coats paper with electrically charged dry coating particles (5-10 microns in size) suspended in air and deposited on the web in a strong electrostatic field. The coating particles are charged with unipolar corona discharge.

Coatings from 3-20 lb. per ream (basis 25 × 38—500) have been deposited at a speed of 100 fpm. Subsequent to depositing the coating (which contains a heat-sensitive binder) on the web, it is fixed to the paper by heat.

The method lends itself to the application of different types of coatings in a variety of colors. Its versatility makes it especially suitable for small job work and specialty and unique coatings.

Drying systems

All coated papers except those coated by hot melt coatings must be dried prior to the stacking of sheets or the rewinding of a web. Varnishing machines of the type used to coat sheets may have very extensive drying systems with panels 60 ft. long. These may achieve temperatures as high as 300° F. Such high temperatures in general, however, are to be avoided because of their adverse effect on the paper. High temperatures, however, are frequently used with coatings based on vinyl copolymers and ethyl cellulose where remelting is required in order to obtain a continuous film and proper gloss. Remelting, of course, amounts to the fusion of the film which is discontinuous when initially laid down. Most solvent based coatings on the other hand will dry adequately at temperatures between 160-250° F.

One of the earliest procedures used for drying paper is the so-called festoon method, which is still in use today. This procedure requires a great deal of space since it involves festooning the paper from rods as it comes off the machine. The paper, hanging in festoons, then moves slowly through a drying tunnel. The festoons may be 12 ft. long and the web may be several feet wide. The advantage of the festooning machine is that the paper is permitted to dry for periods up to fifteen minutes while at the same time the machine may run at speeds as high as 300 fpm. Higher speeds may be achieved if the web is narrow.

In the conveying method of drying, paper is conveyed through a tunnel at speeds of 600-1000 fpm. This involves a short drying cycle, rarely exceeding 20 seconds. Frequently, these ovens have two levels so that the effective length of the oven is twice its actual length. The ovens are heated with hot air and the air in turn may be heated either by steam, electricity, or gas. It is important to distribute the air uni-

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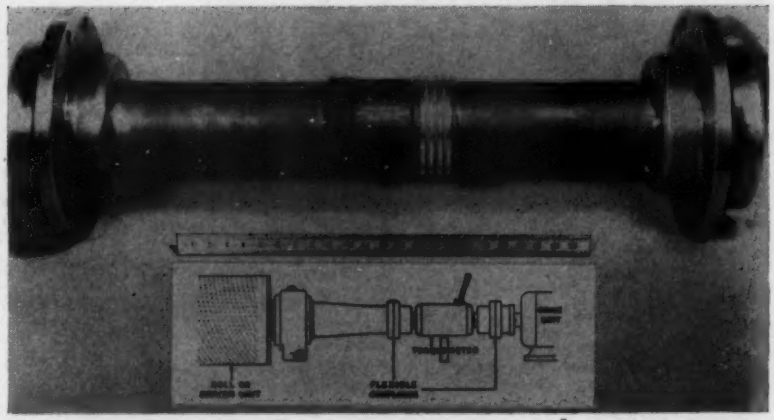
Wet end instrumentation — boosts paper production

NEW TYPE INSTRUMENTATION is proving to be of increasing value in the operation of papermaking machines, giving increases in production, improved quality of paper, and reducing machine and down time. In the past five years electric load sensing devices have been applied extensively to the press section of paper machines made by Downingtown Mfg. Co. They have served here as guides in maintaining nip pressures uniform and at most efficient values. For example, a 153-in. cylinder machine was rebuilt to operate with 26 SR-4 Load Cells as the sensitive elements, and recording instruments, thus achieving both faster production and improved paper quality.



Simplicity of torque measurement on the wet end drive shaft of the 196-in. trim fourdrinier type board machine at Gaylord Container Corp. is shown diagrammatically. Electrical cable connects the torquemeter with a recorder which gives a continuous record of horsepower input.

Couch drive torque indicators

Similar improvements are now being made in the wet end drive of paper machines. One of the most beneficial installations of load measuring instruments is in the Gaylord Container Corp. plant in Bogalusa, La., where the in-shaft of the couch of a 196-in. trim fourdrinier type board machine is driven through a torquemeter using a Baldwin SR-4 Torque Pickup of 200,000 in.-lb. capacity, built by Baldwin-Lima-Hamilton Corp.

The problem at the Gaylord plant was to reduce power requirements and increase wire life. Numerous machine changes had been made at the wet end but wire life dropped off when attempts were made to remove too much water at the flat boxes. This and other changes were made more or less blindly until their effects on power requirements could be observed continuously.

Couch drive torques are indicated and recorded continuously by an instrument located on the front side of the machine at the wet end where it is readily accessible to guide machine tenders and supervisors in operating the machine. The drive shaft is turned at about 500 rpm by turbine and the machine runs at 1100 to 1600 fpm. The Baldwin torque pickup for the Downingtown torquemeter consists of SR-4 resistance wire strain gages bonded on a 5¼-in. diameter shaft 3½ ft. long over the couplings. Electrical impulses produced by shaft strain and proportional to shaft torque, are transmitted by a Wheatstone bridge of strain gages in the torque pick-up through slip rings to the recorder.

Effect on operation

Operation of the wet end has been improved in several ways, it is reported by Mr. A. Suter, General Superintendent, Pulp and Paper Mill Div. Probably one most important has been in guiding changes in operating technique which have reduced the load on the wire couch without reducing its speed. Thus wire life has been increased 25 per cent and down time decreased proportionately.

The ability to measure the power input continuously has permitted determination of the optimum number of flat boxes and the necessary amount of vacuum in relation to the power or torque required to drive the wire couch most efficiently on any particular grade of paper. In other words the torque measurements made it possible to determine by torque variations how changes in vacuum affect the drag of the wire over the flat boxes. This vacuum has been reduced to lower values than previously believed possible. In addition to a reduction in power requirements and prolonged wire life, reduced maintenance of flat box covers is also expected. As a result it was found advantageous to move one of the vacuum pumps from flat boxes to the couch, thus removing more water at the couch.

Changes in loading on the wire can now be observed while running. This is especially important when changing the type of sheet on the wire and checking the effects of factors resulting from varying properties of the stock. By varying the vacuum on the flat boxes, power requirements can be adjusted to the minimum requirements of each type of paper.

The torque also shows any change in pulp. When a carload of "bad wood" goes through it can be detected by the effects on drive shaft torque. Any change in consistency or change in setting of the jordans is indicated on the chart and foamy pulp shows up in fluctuating torque.

In addition, torque measurements simplify the "nursing" of a worn wire until a convenient time for change or shut-down; and the torque records show down time since the recorder runs continuously.

In general this method of continuous torque measurement and records have proved such a valuable guide in modifying the set-up of equipment on the wet end and in changing running techniques that another is being considered for installation on a section of driers. Since siphons and spiders go out after a period of time and the driers run filled with condensate, it is believed that the power to drive a drier section goes up enormously. A torque-meter will permit a closer check on the power used by the drier section.

Design improvements in large ac motor drives for the industry

M. R. LORY* and W. SCHNEIDER**

Among design improvements in large ac motors are (1) Thermalastic insulation (both tape-wound and pressure-impregnated) (2) bearings designed with thrust faces to withstand enough thrust to slip telescopic flexible coupling, and (3) special features in chipper motors

THE APPLICATION of rotating electrical machines in the pulp and paper industry has always presented a major challenge to the designers of electrical insulation, because the operating conditions encountered in these particular service applications require a high degree of moisture resistance, and resistance to chemicals which are used in the bleaching and processing plants. Atmospheric contamination by chemicals, and severe moisture or even splashing water, such as are found in the pulp and paper industry, not only stress otherwise safe creepage surfaces, but also tend to penetrate into the insulation wall through minute openings of the varnish films and insulation barriers. Added to these already strenuous conditions are the usual contaminants of dust, dirt, and oil or grease film deposits common to practically all industrial plants.

The severity of these service conditions required relentless efforts of research scientists and engineers and brought forward a new insulation called Thermalastic insulation (Fig. 1).

Thermalastic Insulation

Thermalastic insulation was first applied to high-voltage turbine-generator windings in 1949 and became the Westinghouse standard for this use in 1950. Even while the first Thermalastic-insulated coils were being wound, work was under way to extend its application to other electrical machinery, where the manufacturing problems were considerably different. This development has been completed, and the characteristics of Thermalastic insulation have been extended to waterwheel generators, synchronous condensers, and large motors (Fig. 2.)

Thermalastic insulation is basically a mica insulation. Large mica splittings are bonded either into a tape or wrapper, depending on the size and the shape of the coil to be wound, with a strong, resilient synthetic resin. The completely insulated coil is vacuum and pressure impregnated with a solventless, heat reactive, synthetic resin and then cured at elevated temperature. This impregnation process with the solventless synthetic resin produces a fill and consolidation of the insulation never before possible with other impregnants. The excellent wetting characteristics, plus the low viscosity of the resin, make it possible to fill even the most minute voids and interstices, resulting in a practically void free, thoroughly consolidated insulation. The complete chemical reaction of the resin without solvent evaporation during processing gives further assurance that no voids are created within the insulation while the heat reaction takes place.

Special characteristics of Thermalastic insulation

Because of the materials used and their method of application, Thermalastic insulation has many advantages over conventional types:

1. The dielectric breakdown strength per unit thickness is increased at least 20 per cent.
2. The voltage endurance (time to failure at a given voltage) is increased by a factor of more than ten.
3. The resilient nature of the resin impregnant makes Thermalastic an elastic insulating material.
4. Differential movement between copper, iron, and insulation during cyclic heating does not result in rupture or permanent displacement of the mica.
5. Tensile strength is considerably greater than that of conventional insulation.
6. The resin impregnant is thermosetting and does not melt once it is polymerized.
7. The moisture resistance of the resin impregnant itself and the high degree of fill achieved in the impregnating process make the windings highly resistant to moisture.
8. The chemical inertness of the resin impregnant makes the insulation resistant to attack by ordinary solvents, lubricating oils, and weak acids and alkali encountered in most industrial applications.
9. The solidity and density of Thermalastic insulation render it impervious to contamination from many agents encountered in industrial service.
10. The elimination of voids and the density of the insulating barrier result in a lower temperature drop across the insulation barrier.

Special bearings design

In addition to the insulation requirements which are common to all large motor drives in the pulp and paper industry, there are special requirements for many drives.

Many of these special problems are mechanical in nature. One example of this is the problem of the design of suitable bearings for motors to drive jordan refiners. The usual practice is to mount the motor solidly and put on a telescopic flexible coupling which will accommodate the axial move-

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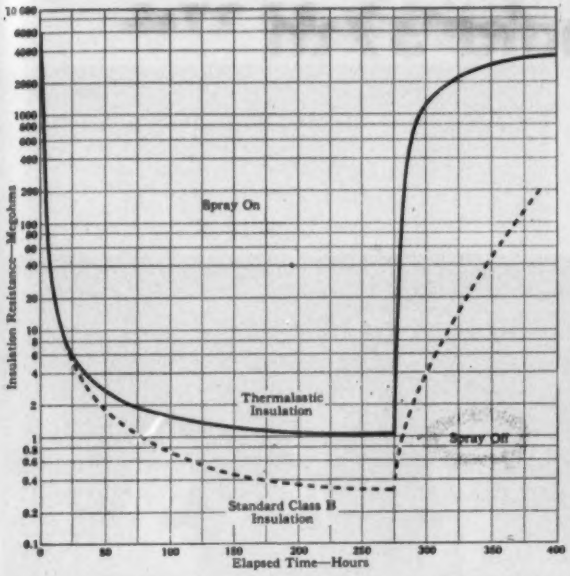

Fig. 1. These results of laboratory spray test show changes in insulation resistance of a Thermalastic-insulated winding compared to standard class B winding.

Fig. 2. Laboratory moisture resistance test on the stator winding of a 950-hp, 4160-v motor. The test lasted 275 hr., and 200,000 gal. of water passed over the winding.

ment of the jordan shaft which is required to adjust the plug. When the plug is adjusted, there is a thrust force imposed on the motor bearing to overcome the friction in the coupling and make it slip. When the coupling is transmitting considerable torque, this force may be quite large. For example, a 450-hp, 400-rpm motor, when carrying full load, may require as much as 1300 lb of thrust to cause the coupling to slip.

In order to provide the necessary, thrust capacity for these forces, the motor shaft is made with large diameter oil throwers on the journal on the shaft extension end. These form thrust faces at each end of the bearing. The bearing shell has babbited faces which are lubricated by oil grooves which carry the end leakage of the bearing oil over the thrust faces. These thrust faces in the bearing can withstand enough thrust to slip the coupling intermittently, but are not designed to take this thrust continuously.

This brings up the question as to how the bearing is relieved of this thrust in a reasonable time after the plug is adjusted. In gear type couplings, the coupling teeth are lubricated, and in operation, there is often sufficient misalignment to cause slight movement of the teeth which will cause the coupling to work itself a little axially to relieve the thrust. Also, the operator can completely relieve this thrust by adjusting the plug a little farther than the final desired position and then backing off to the required spot. This operation slips the coupling far enough so that when the plug is backed off, the motor runs with the thrust surface on the journal out of contact with the bearing, so that there is no continuous thrust applied to the motor.

Some types of couplings which have been used do not have lubrication of the parts involved in telescoping the coupling when the plug is adjusted. As a result, the thrust forces are materially increased, and there is not the same ability to relieve the thrust forces in operation, so that they may be imposed on the motor bearings for long periods. In some cases, it is not even possible to relieve the bearing of this thrust by the process of backing off a little as described above. This is because the friction forces are so high that the flexible parts of the coupling are distorted as the coupling is slipped, and when it is backed off a little, the only result is to remove a little of this distortion, while the remainder of the distortion remains to impose thrust on the motor.

Because of the difficulties experienced with types of couplings other than the gear type in this application, the complete details of the coupling should be given to the motor manufacturer. The difficulties involved in designing a satisfactory bearing are much greater when these couplings, which are not continuously lubricated, are used.

Special features in modern chipper motors

Another application which has special requirements is the chipper. This is especially true of the larger sizes of chippers which are ordinarily driven by low speed synchronous motors mounted directly on the chipper shaft or direct coupled to it. This is possibly the most severe application to which motors are normally applied, and to achieve the satisfactory performance of modern chipper motors has required many special features to be included in the construction of the motors.

The chipper is characterized by:

1. Very high inertia.
2. Torque peaks of high amplitude and regular period to excite torsional oscillations.
3. Severe lateral vibrations excited as each knife cuts the log and severe overloads which approach the pull-out torque of the motor when the largest logs are fed. The load is extremely variable with sudden swings from practically no load to very large overloads and then the load will be suddenly removed.

When the chipper disk is accelerated, an amount of heat equal to the stored kinetic energy of the rotating parts is developed in the starting winding in the pole faces of the synchronous motor. A 175-in. chipper will have 37,000 hp seconds of stored energy. Therefore, it is imperative

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Superintendents hold 37th annual meeting

PAPER AND PULP mill operation from the viewpoint of both the man-in-the-mill and the executive was searchingly examined at the 37th annual convention of the American Pulp & Paper Mill Superintendents Association. Few phases of the industry were omitted in the program, which saw discussions of wood procurement and finished product sales and the technical operations that go between.

In a setting that seemed more or less "at home" for the more than 1000 papermakers and their wives, the convention found time for both work and play. Headquarters for the June 12-14 gathering was the Lake Placid Club in the Adirondacks of northern New York State.

Auchter New President

Elected president of the Association for the 1956-57 year was Martin J. Auchter, vice president for manufacturing of Charmin Paper Mills Inc., Green Bay, Wis. He succeeds Howard H. Street, manager of the Paper & Fibre Div. of National Vulcanized Fibre Co., Yorklyn, Del.

In his annual message Street voiced a plea for accelerated growth. "Within our fiscal year," he declared, "there has been added 151 men to our rolls. There have been 90 terminations an 13 deceased, providing a net increase of 48 men, plus the addition of eight affiliate companies. Within a 10-year period, our Association has increased itself by 76 per cent, whereas the industry has doubled. *We must accelerate our growth rate to at least the pace of the industry to effectively serve in the development of productive personnel.*"

Street pointed out that only about 10 per cent of pulp and paper personnel eligible for membership in APPMSA have actually become a part of the movement. "In business," he continued, "this represents a tremendous market awaiting the delivery of either goods or services. It is an opportunity which I can assure you would be quickly embraced by progressive management in business. While the Association has maintained a growth curve comparable with our previous experience, we should obviously consider plans that include the majority—and not just a small minority of production executives."

MEN PROMINENT in the affairs of the Superintendents Association gather prior to the annual business session. They are (l to r) Martin J. Auchter of Charmin Paper Mills Inc., newly elected president; Harry E. Weston, national secretary-treasurer; Howard H. Street of National Vulcanized Fibre Co., retiring president, and H. M. Reiniger of John W. Bolton & Sons Inc., who announced the 1956 Bolton Award winners

Varied Technical Program

The technical sessions at Lake Placid dealt with such topics as Pulp Mill Operation, Coated Papers and Board, Power, Industrial Relations, Fine Papers and Tissue, Cylinder Board Machine Operation, Kraft Board Fourdrinier, Woods and Woodroom Operation, Mill Maintenance, Material Handling, Cylinder Board Machine Operation and Technical Control.

(These will be condensed or reviewed from the standpoint of new results and ideas in a subsequent issue of *The Paper Industry*.)

New Fifth Vice President

At the annual business meeting, C. Ives Gehring was named the Association's fifth vice president. He is pulp and paper mill manager for Oswego Falls Corp. in Fulton, N. Y.

The same session saw the announcement of the 10 winners in the Bolton Award Contest for 1956. The report was made by Haigh M. Reiniger, vice president of John W. Bolton & Sons Inc. of Lawrence, Mass.

Grand prize winner of $1000 was Mrs. Esther Davis, an assistant in the personnel department at Finch, Pruyn & Co. Inc., Glens Falls, N. Y. Second prize of $750 in the ninth annual competition went to Gerard Chapman, technical director for the Walloomsac Div. of Columbia Box Board Mills.

Bixby Heads Affiliates

Elected to head the Industrial Affiliates for the coming year was Milton M. Bixby of Hercules Powder Co., Wilmington, Del. He succeeds Eugene J. Ward of Cameron Machine Co. New first vice chairman is John D. Dickson Jr. of Stowe-Woodward Inc.

The eight firms that became affiliates of the Superintendents Association during the past year were:

Strictly Informal

A SOCIAL GROUP at the Lake Placid Club lobby included (l to r) John D. Murphy of Chemical Paper Mfg. Co. (back to camera); Richard A. McKay of Holyoke Wire Cloth Co.; L. W. Shattuck, vice president in charge of production for Strathmore Paper Co., and Mrs. Shattuck

GEORGE S. Caroll (r), general superintendent of Newton Falls Paper Mill Inc., expounds on his mill's accomplishments in automation. His fascinated listeners are W. G. Davis (c), vice president of sales for Albany Felt Co., and A. W. J. Dyck, editorial director of The PAPER INDUSTRY

SIMPLE mathematics can solve many problems in papermaking, Harry Williamson (r), consultant, informs D. W. Zeigler, news editor of The PAPER INDUSTRY

NO ARGUMENT here as two mill managers, W. A. Johnson of Pollock Paper Corp. and F. L. Zellers of Chillicothe Paper Co., get together

DEFINITELY no argument here—not even competition-wise: R. M. Buechler of D. J. Murray Mfg. Co. and V. C. Hill of Clark & Vicario

YOU CAN handle anything with steel strapping and corrugated pallets, says J. F. Beckman, assistant director of sales for Signode Steel Strapping Co., to W. L. Tulley, general night superintendent for St. Regis Paper Co.

R. TUTT JR. (r) of Peter Cooper Corp. wins the argument on the diversity of raw materials used by his company. Conceding the point is S. C. Lyons of Georgia Kaolin Co.

HOW BEST TO drape a paper machine in felts poses an ever-recurring problem. Seen here are G. G. Wilson and M. A. Kelly (l and r) of Fraser Companies Ltd. and N. L. Wendell (c) of Draper Bros. Co.

Charles R. Stevens Inc. of Toledo; United States Movidyn Corp., Chicago; American Cyanamid Co. (Dyestuff Dept.), Bound Brook, N. J.; Morey Paper Mill Supply Co., Fitchburg, Mass.; Hills-McCanna Co., Chicago; Multi-Metal Wire Cloth Co. Inc., New York, N. Y.; Clark-Aiken Co., Lee, Mass., and Stickle Steam Specialities Co., Indianapolis.

Visit Newton Falls

A highlight of the three-day meeting was a tour of the plant of Newton Falls Paper Mill Inc., one of the most modern push-button operations of its kind in the country. Host for the visit was Ronald W. Hynes, president and general manager of the firm.

Association officers for 1956-57 in addition to Messrs. Auchter and Gehring are: first vice president, Albert E. Bachmann of Missisquoi Corp.; second vice president, Howard E. Wehr of the Mead Corp.; third vice president, A. C. McCorry of St. Regis Paper Co., and fourth vice president, Thomas S. Coldeway of St. Joe Paper Co. Harry E. Weston of Chicago is national secretary-treasurer.

Coating Methods

(Continued from page 300)

formly and enough air must be circulated to keep the atmosphere well below the explosive limit of the air-solvent vapor mixture. To be perfectly safe, the mixture of vapors should not contain more than 1 per cent of the solvent which is being removed. Oven temperatures are as high as 350° F.

In the arch dryer paper is cast over an arch in an oven heated by steam. This type of drying is especially important for paper which has a tendency to curl. Strong films applied to one side of the paper may tend to curve it. Also gumming of paper tends to promote curl.

In the wheel drying method paper is passed over wheels which may be as large as the construction of the housing permits. As the paper passes over the wheels, at speeds as high as 1000 fpm, it is subjected to a stream of air which has been heated to temperatures as high as 250° F.

Design Improvements

(Continued from page 303)

that the bars in the pole face be made much larger than those used in standard motors. Also, the design of the short-circulating rings must be modified to take care of the large amount of heat developed during starting.

The rotor spider must be strong enough to withstand the shock overloads and torsional vibrations. Some large chippers have been made with spiders machined in one piece out of a forging. Others are of fabricated built-up construction, but are "beefed-up" so that they are very heavy and rugged. The frames must withstand vibration transmitted through the foundation from the chipper and vibrations developed in the motor by sudden torque changes with the extremely variable load. Consequently, they are made heavier, with much extra bracing of the mounting feet.

Bearings and shafts of coupled motors are made extra large for this severe service. It is important to make sure that the frequency of making cuts, that is the number of knives times the rpm does not coincide with the torsional natural frequency of the system. Otherwise there is danger of breaking the shaft. With a tendency to go to more knives, the frequency of cuts is increased, which may make it necessary to increase the shaft size to put the natural or resonant frequency out of the operating range.

One effect of the rapid changes in load is to induce transient alternating currents in the field. These may cause the pull-out protective relay to operate when the motor has really not pulled out of step. It is well to investigate the pull-out protection very carefully on a chipper when the pull-out relay takes the motor off the line. Make certain that real losses of synchronism are occurring and not just faulty relay operations. One way to investigate this is to cut out the relay and post a man to trip the motor off manually if it pulls out of step. Then run the same type of logs which previously caused the pull-out relay to operate and see if the motor can handle them.

Sales promotion of paper products

WARREN B. BULLOCK*

The trend is toward cooperative market research aimed at finding new uses for old products and developing new products for specific requirements

NEW USES for new papers might well be the slogan for the American paper and paperboard industries.

This principle is the activating force behind the decision of major units of the paper and paperboard industries to spend upward of a quarter of a million dollars a year to increase the sales of their products. The program also envisages the development of new usage for existing standard grades of paper and paperboard.

Technically this program is market research. Practically, however, it is an effort to increase the sales of papers and paperboards by devising new uses in widely diversified fields. Enormous increases in tonnage consumed and millions of dollars in returns are seen as a result of such studies.

Combining sales promotion with technical research has already done much to help make the industry the fifth in the Nation in value of output. How to further develop papers and paperboards for new uses is only one part of the problem. As an accompaniment to the development of special types, a first essential of sales promotion is to demonstrate the greater appeal of a product which is attractively and efficiently packaged.

One expert in this field has pointed out that the makers of prepared, processed or preserved products have gone farther ahead in the development of the contents of the containers than in the packaging.

The new trend is a radical departure from the old conservatism of the paper industry. The importance and the possibilities of the industry's products have not been realized by the

*Manager of Import Committe of the American Paper Industry

public nor, all too often, by the producers themselves.

The conversion from a "come-and-get-it" attitude to one of "why-don't-you-try-this" started slowly, but is gaining in momentum as success after success has increased the sale of the product of those groups which have entered upon a systematic market promotion campaign.

Trend toward group or cooperative effort

In the old days, each company sought new business by its individual promotions. Now the trend is to base such individual promotion on a background of consolidated aggressiveness on the part of the group as a whole. Long ago, one company initiated a forward-looking sales campaign by suggesting new and various business forms. Another company worked out a honey-comb type of kraft material for use in combination with metal and wood in building equipment.

Today, the paperboard shipping container is displacing the old-time wooden crate for the efficient but economical shipment of citrus fruits, as well as many other agricultural products. Thousands of tons of additional paperboard supplanted the older type of shipping containers as a result of group activity. This broad field has experienced the most important expansion of new uses of paperboards, as well as large financial returns.

In some ways this over-all paper and paperboard industry program resembles the international explorations under way in Antartica for the exploitation of the resources of an almost unknown continent. Its potentialities are equally unlimited, if, and what is most important, group efforts can be applied to exploration on a scale commercially impracticable to a single company. The estimate that a quarter of a million dollars a year is being expended in these joint efforts is undoubtedly a most conservative figure.

The methods of establishing programs of joint market research vary from group to group, but all are aimed at a common purpose, the finding of new uses for old products, and the development of new products to meet the specific requirements of a specific commodity.

In some groups individual members accept the responsibility for the promotion of special campaigns for the benefit of all. In another type of organization an industry has set up a special public relations program financed by the parent organization. Still another type of organization is set up to pursue the search for new uses as its central objective.

Some of these sales promotion campaigns have been conducted quietly without fanfare. Similar campaigns are being crystallized by some organizations which are not yet ready to announce a sales campaign.

This survey of the promotional field does not presume to list the activities of various groups. It should suffice to name some of the announced programs as evidence of the changed attitude of the industry, an attitude best expressed as cooperative, economic team play to win expanded markets.

Examples of the cooperative effort

The cooperative type of organization is seen in the paper napkin field. Here a basic program has members of the Paper Napkin Association participating as individuals in the finding of outlets to encourage the buying public to switch from fabric to expendable tissues. They suggest new uses for the products of the entire group rather than offer a single company's product for sale. This is selling an idea instead of a product.

A still different approach is that of the Kraft Paper Association which has set up within itself a promotion campaign. This program has been publicly announced and is described in part as follows in a statement of its methods, personnel and purposes.

"For long the kraft industry successfully competed with burlap, cotton, tin, glass, foil, chamois, jute and linen but things are different now. Not only are these products fighting back to recover lost ground but a new group of products known as transparent films is walking right in and pushing kraft paper aside. Kraft has been hurt by these new products. I can't say that we like it, but we accept it logically and study ourselves just as we forced our earlier competitors to study us. Our program must be to give up the hopeless fields, recover those fields we lost carelessly and find new outlets."

This outline of the problem has been followed by the appropriation of $50,000 to support the first year of work which will be primarily investigative. The Association has engaged Edwin T. Gibson, formerly Executive Vice-President and a Director of General Foods Corp., to head up this new program. He will be backed by a research and development committee to be made up of marketing, research and publicity specialists from member companies. The campaign will include close cooperation with associations made up of companies converting kraft paper into finished products for the consuming world.

In the Glassine & Greaseproof Association a professional public relations agency is set up to operate under the aegis of the Association. This agency seeks mass markets represented by such quantity purchasers as the coffee trade which needs grease resistant papers of a type to retain the flavor of the coffee berry from the roasting oven to the grocery and the percolator. Figures are not made public as to the amount involved in this endeavor, but it is said to approach $30,000 annually over a period of years. A mass market for these specialty papers is sought through such media as packaging conventions, exhibitions and the like, to say nothing of a series of publications' aimed at various industries, such as breakfast foods.

Opportunity unlimited

Much has already been done. Looking to the future is opportunity unlimited. Imagination is the handmaiden of research.

Wet-strength paper is rapidly becoming popular. Wet-strength paper bags are now used to carry moist groceries such as lettuce from the store to the home, and the army uses wet-strength papers for the production of military maps which will not be ruined in rainy weather. And speaking of lettuce, promotional efforts have resulted in its shipment in paperboard boxes from the lush valleys of California to New York. Every patron of a grocery store knows what advances have been made in the field of frozen foods, yet the paper industry has not kept pace with an equally advanced form of packaging.

The story of plastics and the paper industry is just in its opening chapters. How far it will extend in quantity use of plasticized papers and in a variety of uses cannot even be guessed at. Polyethylene papers and boards are already in use in the dairy industry for bottles and ice cream holders, etc. Polyethylene coating is an innovation which is becoming so important that a special group has been organized within the industry to study this field. As yet this group is feeling its way by a collection of statistics of production of such papers, but a marketing study is a natural second step.

These are but hints of the tremendous possibilities which market research may involve. By organizing its research the paper and paperboard industries can recover a thousand fold all the funds expended in their studies.

Use of corrugated fiberboard in forms for cement castings

THAT VERSATILE MATERIAL, corrugated fiberboard, so well known as a packaging material, is constantly being used for new money- and time-saving applications—some of which are not at all related to packaging.

A new and unusual use as form material for cast concrete building sections has been recently explored and successfully applied to major construction projects.

Two companies which have helped pioneer this new construction method are Inland Container Corp. and Huber, Hunt & Nichols Inc., both of Indianapolis, Ind.

Last fall, Huber, Hunt & Nichols received the contract for a 25,000-sq. ft., one storey, completely fireproof building in Crawfordsville, Ind. The design of the building called for over 350 identical individual unit roof panels of reinforced concrete. Each panel was to be 18 ft. long and 4 ft. wide, with a live and dead load capacity of 70 lb. per sq. ft.

This was a situation made to order for the use of corrugated fiberboard forms. First, the quantity of identical pieces was large enough to make practical the necessary "tooling up" for mass producing corrugated forms. Second, the design of the roof panels was of a type that would require a rather complex wood form. This induced Inland Container Corp. and Huber, Hunt & Nichols to design and develop a corrugated form that would produce a concrete panel to meet building specifications and rapid assembly requirements even by unskilled men.

The concrete pouring of the 2000-lb. units took about two months under winter weather conditions. Every one checked exactly to specifications.

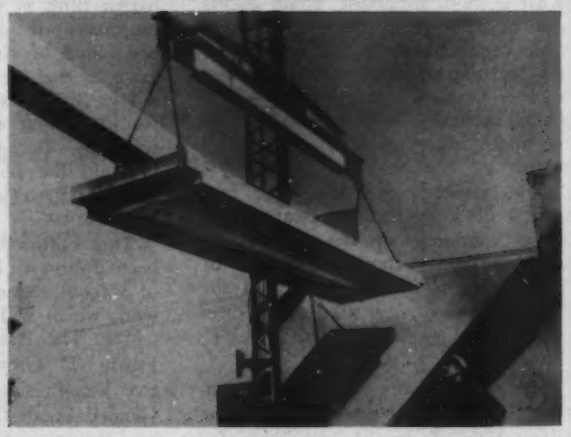
Cost advantages

While material costs of corrugated vs. other forming materials for the job may be considered comparable, the use of corrugated forms reduced labor costs by 66 per cent on this phase of construction. There were additional benefits. The corrugated forms could be made in advance, allowing uninterrupted delivery of concrete to the job site. The corrugated form material is light and easy to handle. It also saves storage space.

Each corrugated fiber form was new and accurate. It could be assembled without measuring, checking or repairing. Later, these forms were easily removed and disposed—actual stripping time did not exceed 3 min. per panel.

Assembling and setting the corrugated forms, which are accurate and easily handled; they can be assembled without measuring, checking or repairing

Pouring the 2000-lb. concrete units in the corrugated fiber forms, the use of which reduces labor costs by 60 per cent



Hoisting the 18-ft. long and 4-ft. wide reinforced concrete roof panels into position; 350 identical roof panels were required for this construction job

to give you highest sheet standards

Edgar Clay technicians were *first* to "Spray Dry" paper coating clays—the same process used to make your morning's instant coffee.

Results? Ultra-uniform coating clays that do amazing things to paper quality.

Today's "slick" magazines—and countless other printed messengers—owe their bright, smooth finish to this processing milestone. The means and the end are inseparable "first cousins."

Papermakers reap wide benefits from EDGAR Coating Clays, and the modern processing and quality control methods behind them. High brightness, low moisture, minimum residue, controlled viscosity, plus *true uniformity* . . . all are unvaryingly yours in *every* car, year in, year out.

Edgar Spray Dried Products

SPRAY-SATIN Coating Clay: A fine fraction, spray dried, predispersed coating clay with unmatched uniformity, low moisture content, excellent make-down properties, high bulk density, and high brightness. Specially fractionated—ideal for both high and low solids machine and conversion coating and size press coating applications.

PREDISPERSED HT Coating Clay: A spray dried, predispersed, intermediate fraction machine and conversion coating clay suitable for both high and low solids applications . . . excellent for size press pigmentation.

Here's Help For You: To help you select the EDGAR *Paper Clay most suited to your particular requirements, there have just been published the full specifications and basic properties of all* EDGAR *Coating and Filler Clays . . . a copy is yours without obligation . . . please use the coupon below.*

Edgar **EDGAR PRODUCTS** *from . . .*

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- ☐ Basic Properties of Edgar Paper Clays.
- ☐ Other first-hand information and samples pertaining to:

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You can't beat HAMILTON Felts . . .

for saving break-in time!

Next time you have to replace an old felt, try a *Hamilton* Felt. You'll save downtime because Hamilton Felts are pre-shrunk—"broken-in". No need to keep adjusting stretch rolls to take up the slack that hangs down in the pit . . . Hamilton Felts *do not* sag or stretch . . . They *do* remove more water, deliver dryer sheets to the driers, permit operators to run machines at higher speeds with fewer stops and less broke. Isn't that what *you* want, too?

Hamilton
FELTS

MIAMI WOOLEN MILLS
Established 1858

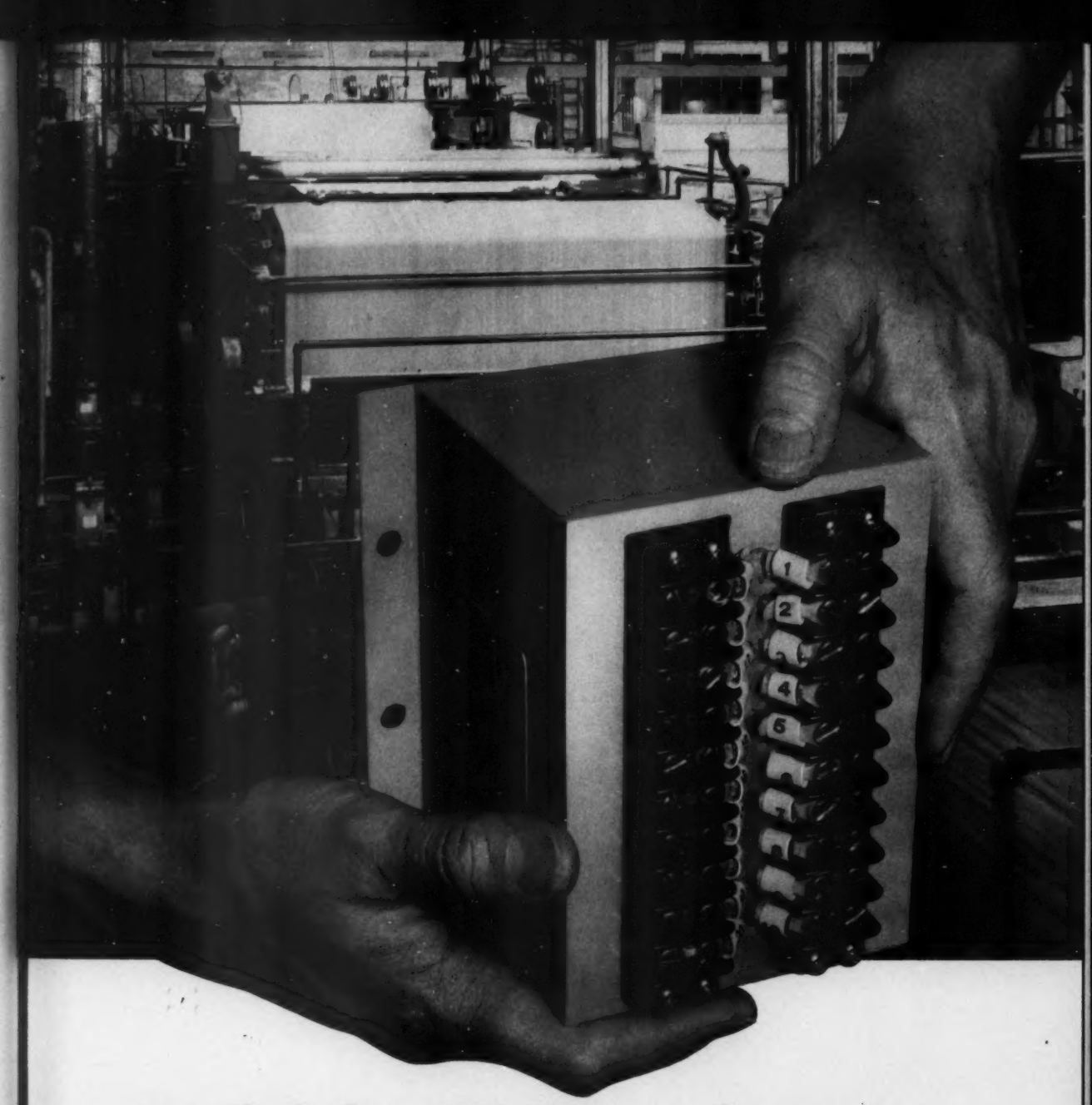
"I have a new cap, thanks to Carl F. Simon,

Paper Mill Superintendent, Wisconsin River Division, Consolidated Water Power and Paper Co., Stevens Point, Wisconsin."

HAM FELTZ says:

"If you can suggest a better idea (a very rough sketch will do) of the type of hat the best wet-end operators will wear this fall, send it in. If I wear it in future ads I'll send *you* a new Stetson."

SHULER & BENNINGHOFEN, HAMILTON, OHIO



Availability 99.9%, or better . . .

for Westinghouse Magamp regulators on sectional drives

Westinghouse Magamp* magnetic amplifier regulators for sectional drives help boost your paper machine production by reducing down time. They provide precise, automatic control and co-ordination of different machine sections, permit increased machine speeds without sacrificing paper quality.

*Trade Mark

Here's how Westinghouse Magamp regulators allow continuous, top-speed operation of your paper machine. →

WATCH WESTINGHOUSE *WHERE* **BIG** *THINGS ARE HAPPENING* **TODAY!**

Westinghouse Exclusive!

Position and speed signal combined with Magamp cuts down time

Now you can operate your paper machine to the limits of their design, with complete confidence that dependable, accurate control will maintain paper quality.

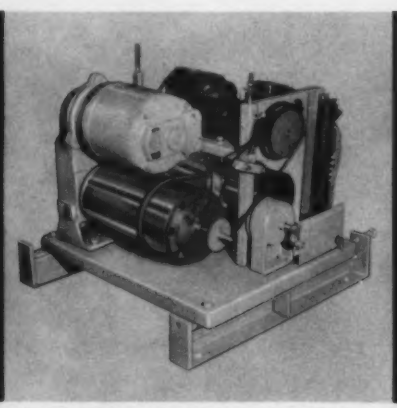
Westinghouse can offer this outstanding performance through its exclusive differential error-detecting unit which combines position and speed signal output with the Magamp regulator.

Teamed with separate position cue and speed cue, Magamp provides accurate speed matching that assures positive control of section draw over the operating speed range. Response is unusually fast.

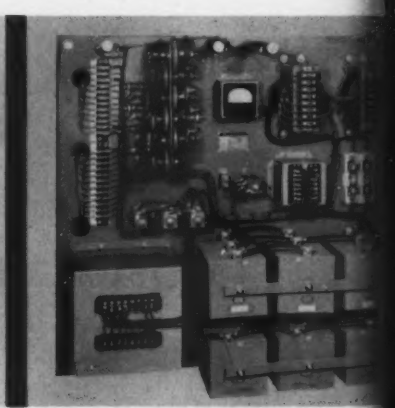
Magamp has no tubes or moving parts. It's rugged, reliable, efficient . . . requires less maintenance than any other type of regulator available. Confirmed records of more than a million unit regulator operating hours show a total availability of better than 99.95%.

Fully automatic control, arranged for convenience of the operators, assures higher production efficiency. Once set, Magamp stays set without adjustment. Elimination of line shafting, belts, pulleys and clutches reduces maintenance and outage time, results in lower operating costs. Magamp units are panel-mounted and factory-wired for easy installation.

Section drive unit is assembled complete with gearing before it leaves Westinghouse plant. Installation costs are reduced, time is saved.



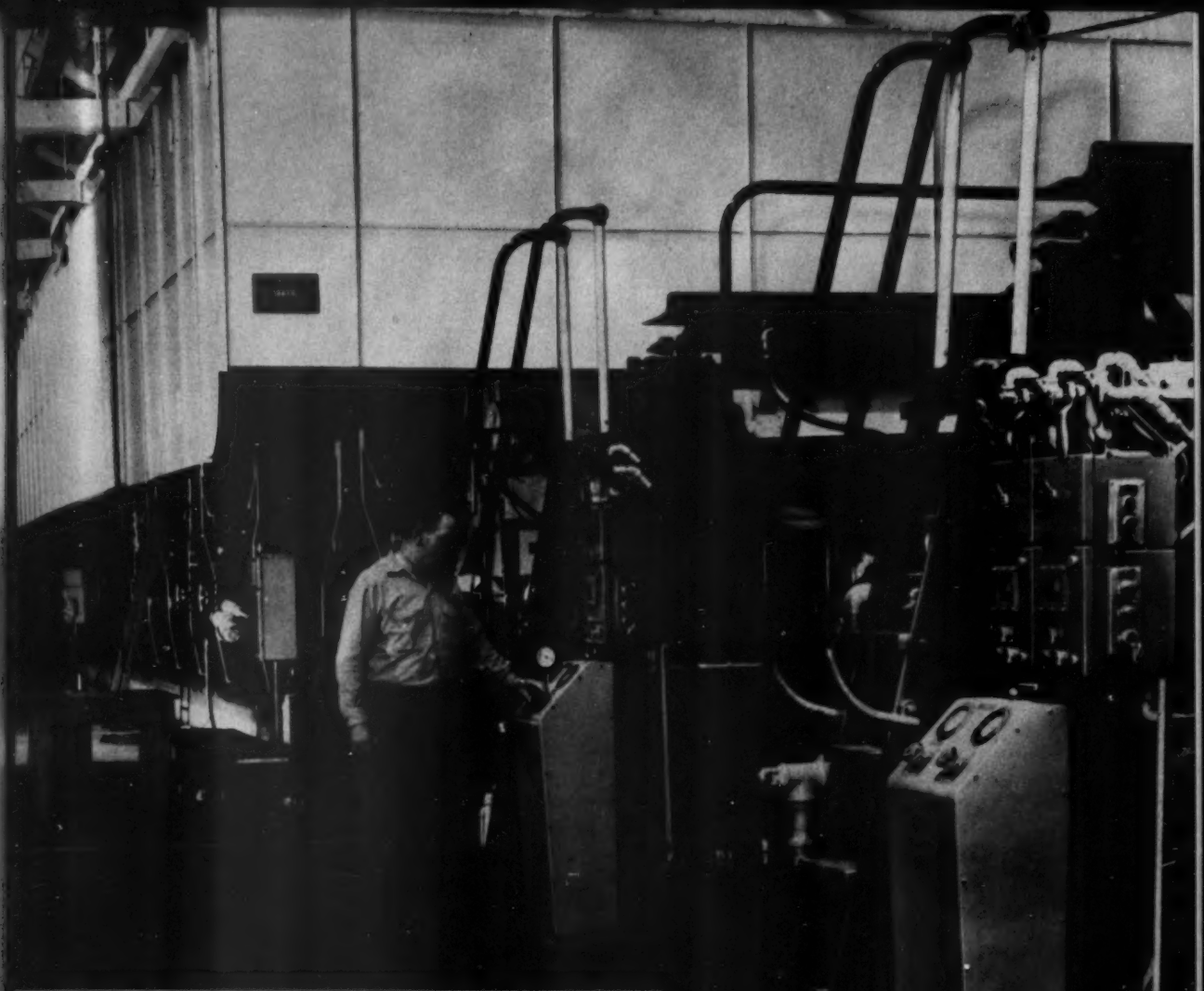
Error-detecting unit (cover removed) provides electrical position and speed signals to the Magamp panel. A minimum of moving parts assures greater reliability.

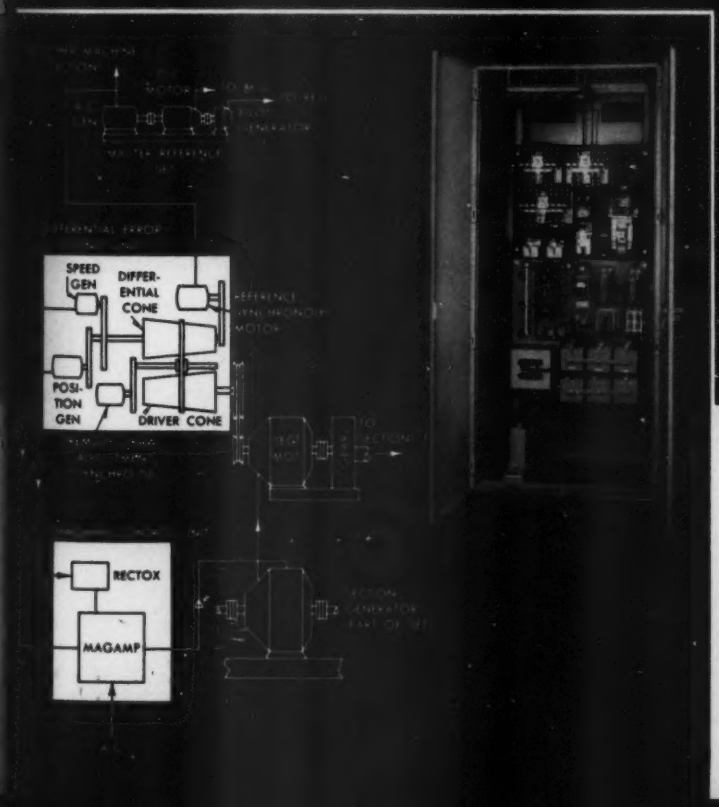


Magamp panel, located in control cubicle, amplifies electrical signals to maintain synchronism among machine sections.

WATCH WESTINGHOUSE!

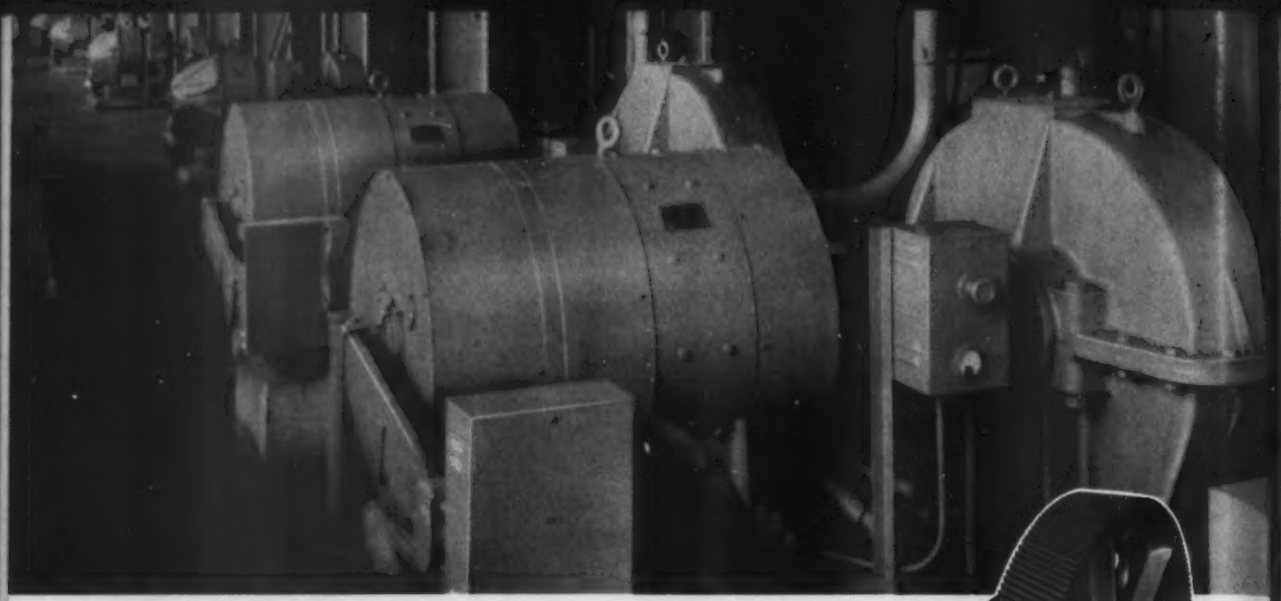
*WHERE **BIG** THINGS ARE HAPPENING **TODAY!***





Magamp regulators on this three-year-old installation have achieved better than 99.9% availability. Operator's control stations (above) and a section control cubicle (left).

How Error-Detecting Unit Operates: Individual section motor speeds are matched to a common reference master set through a mechanical differential. Cone pulleys allow for draw adjustment. The differential output shaft is connected to two small pilots which furnish electrical position and speed signals to the Magamp.



Westinghouse speed reducers, specially designed for paper mill service, are self-lubricated with single helical gears and antifriction bearings. Gear units for the wet end are supplied with dual seals, special breathers and special finishes.

Westinghouse sectional drive assembly gives you five big advantages

Of all sectional drive manufacturers, only Westinghouse makes its own gearing in addition to the electric equipment—thus providing you with one-supplier responsibility for the entire drive system. This assures you several important advantages:

Equipment selection and ordering simplified . . . only Westinghouse need be consulted.

Convenience . . . co-ordinated delivery of all equipment eliminates waiting for component shipments from different suppliers. Only one point of contact is required for servicing all, or any part, of your drive assembly.

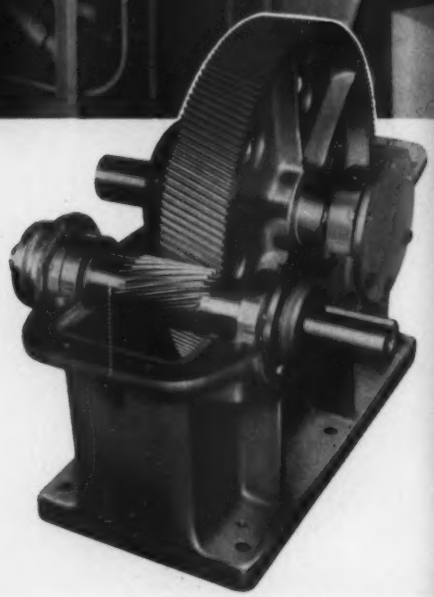
Easy to install . . . no complicated alignment and coupling problems. Every piece of equipment is designed to fit into a unified drive assembly.

Long, dependable service . . . controls, motors, flexible couplings, speed reducers are engineered to work as a team for peak efficiency.

Westinghouse gearing . . . including speed reducers and gearmotors . . . also makes an excellent choice for other applications throughout your paper mill.

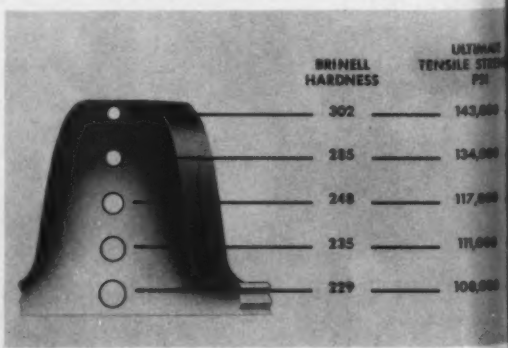
An experienced Westinghouse engineering team will work with your staff and consulting engineers on planning and maintenance throughout the drive assembly's lifetime.

Contact your Westinghouse sales office for further details. Ask for a copy of B-6109, *Magamp Sectional Drive for Paper Machines.* Or write, Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania. MP-3045



Single helical gear puts more teeth in action, provides greater load-carrying capacity and smooth, quiet operation. Top section of speed reducer split case can be removed for easy inspection and maintenance.

Tough outer surfaces reduce wear, resilient cores cushion operational shocks. All gears, shafts and pinions in Westinghouse speed reducers have this feature because of exclusive Westinghouse BPT heat-treating process.



WATCH WESTINGHOUSE *WHERE BIG THINGS ARE HAPPENING TODAY!*

CURRENT COMMENTS

Federal action on mergers . . . talk of ease on paper shortage and prices

Mergers, federal interposition in mergers, rising prices and shortages combined to make the month one of outstanding news developments. Demand is forcing prices upward and encouraging development of plans for expanding capacity. Whether the optimism as to future consumption is deserved remains to be learned in the distant months ahead. Some figures, however, indicate that a certain increase in tonnage consumption can be expected.

In the twenty years just ending, according to rough computations, production of paper and paperboard increased 15,000,000 tons. Of this increase, some 38 per cent was definitely due to increased population. The balance is credited to the development of new uses for recognized grades of historic papers and new uses for newly developed types of paper. Whether the new-use factor will continue may be doubtful, but the population growth is almost certain to be reflected in increased total consumption.

In any event, present demand is unappeased. First quarter production climbed to an all-time high for any three-month period in the industry's history, an increase of 4½ per cent over the last quarter of 1955. Prices have continued to stiffen, and there is no sign of inventory accumulation. Clyde B. Morgan, president of Rayonier Inc., the world's largest producer of chemical wood pulp, says this is no time to sell the rayon textile industry short, and the same goes for paper usage. He does not anticipate any material drop in rayon textile production by reason of the new types of man-made fibres, but even so the market for paper pulp is unsatiated.

Trend toward mergers

The trend toward mergers of important industry units has led to action by the Federal Trade Commission against Scott Paper Co., which must answer to charges that its acquisition of various other companies is a violation of the anti-trust laws. A hearing is scheduled at Chester, Pa., the home of Scott, on August 15. Scott is expected to make a determined protest against the charges. The Federal Trade Commission in its complaint cites Scott's acquisitions of Soundview Pulp Co., Detroit Sulphite Pulp & Paper Co. and Hollingsworth & Whitney Co. as justification for its claim that competition is being suppressed. The commission says that Scott with its present 44 paper machines compared with its 25 machines in 1950 has now 38 per cent of the sanitary paper market, as compared with the earlier 30 per cent.

Meanwhile, the commission has forced Union Bag & Paper Corp. to limit its holdings in Hankins Container Co. to 9 per cent and gives Union 90 days in which to sell any surplus present holdings. Interlocking directorates and agreements as to market areas are prohibited.

Despite this action and the commission's attitude toward Scott's expansion, Union has proceeded with definite plans for a merger with Camp Mfg. Co. to give it a manufacturing entry into the bleached kraft field.

Still another merger is reported. Negotiations are admittedly underway for some form of union between National Container Corp. and Owens-Illinois Glass Co. This would place radically different lines of packaging materials—glass and corrugated boxes—in a combined organization, as an indication of the modern trend toward concentration of distantly related industries into a common unit.

Report of shortages

The report of shortages in newsprint supply and resultant higher prices is now being duplicated in the book paper field, according to a report to the convention of American Magazine Publishers. A speaker told the publishers that by 1960 the demand for magazine paper will reach 4,500,000 tons, with an estimated supply of slightly over 4,000,000 tons. There is even suggested a restoration of priorities if the government is unable to secure relief for the current shortage.

On the other hand, reports of projected newsprint producing capacity continue to flow in, the latest being the Bowater plan to add to its production facilities in the pulp field. A South Carolina mill will have a 100,000-ton annual capacity. While the announcement indicates a venture into the coarse paper field, the Bowater stockholders were told that in the opinion of Sir Eric Bowater the present imbalance between supply and demand in the newsprint field will be eased by 1958 or 1959. American thought is that this imbalance is much nearer to rectification than 1958.

Reciprocal trade agreement

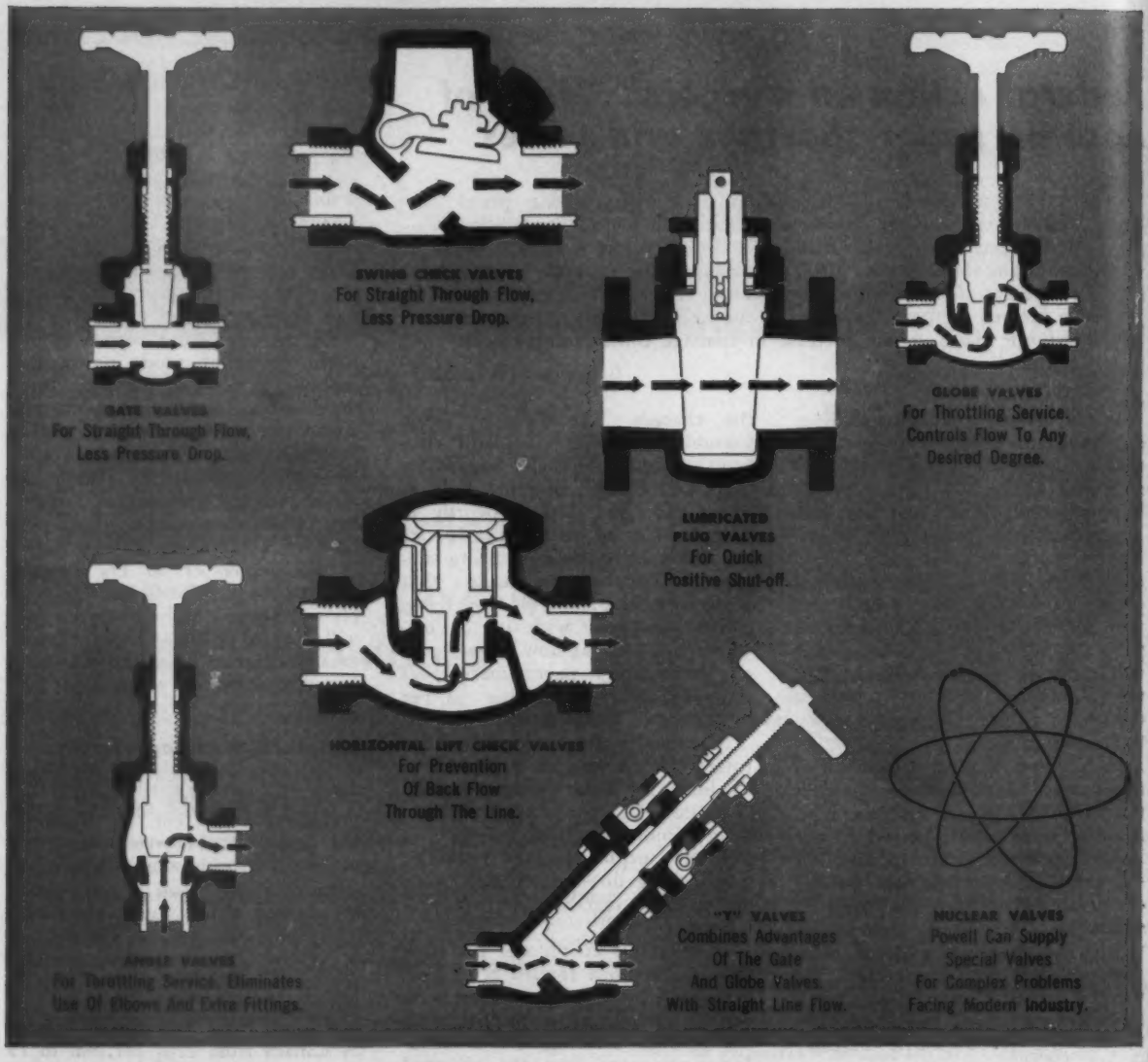
The long expected announcement of reciprocal trade agreement negotiations came out of Washington June 7 and covered the entire paper field with the exception of writing papers and plain paperboards and a few minor specialties. The reductions were at the rate of 5 per cent a year computed on existing rates for three years. Canada is boasting about its concession on newsprint paper, which is reduced by Canada from 22½ per cent to 15 per cent. This reduction affects only 250,000 dollars a year, including groundwood printing papers, while Canada's exports on a duty-free basis into the United States total hundreds of millions of dollars a year.

Financial Reports

President Eisenhower's intestinal illness caused a short-time flurry in the nation's securities markets, but the impact on paper mill issues was not as severe as in most of the industrial list.

*Current Comments are contributed, and the opinions expressed do not necessarily reflect the views of the publisher.

POWELL
for all valve needs



for every flow control problem there is a right Valve

Powell can supply this right valve—*made right* of the right material*. Every part of every valve must pass rigid inspection. And as a final step in manufacture, every Powell Valve has *Performance Verified* through an *actual line test.*

As an aid in selecting the right valve, the basic valve designs are illustrated here. For complete information on the wide range of sizes and materials available in each type of the basic valves illustrated above, consult your Powell Valve distributor. If none is located near you—or if you have a special flow control problem—write direct to The Wm. Powell Company, Cincinnati 22, Ohio.

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The Wm. Powell Company, Cincinnati 22, Ohio . . . 110th YEAR

POWELL VALVES

*BRONZE, IRON, STEEL AND CORROSION RESISTANT VALVES.

Current comments . . .

Net incomes

Celotex Corp.—Net income for six months ended April 30 was $2,695,598 as against $1,854,676 for the comparable period a year ago.

Federal Paper Board Co.—Net 1955 income was $2,504,000 as compared with $2,837,000 for 1954.

Marathon Corp.—Net income for six months ended April 30 was $3,703,012 as compared with $4,065,332 for the comparable period a year ago, though net sales rose to $70,000,000 from last year's $61,000,000.

National Vulcanized Fibre Co.—Net income for 1955 was $693,356 as compared with $37,414 for 1954.

Oswego Falls Corp.—Net earnings in 1955 totaled $2,127,630 as aginst $1,705,666 a year ago.

Rayonier Inc.—Net income for 1955 was $15,900,000 as compared with $11,866,616 in 1954.

St. Regis Paper Co.—Net income for 1955 was $19,000,000 as compared with $14,930,489 a year ago.

West Virginia Pulp & Paper Co.—Net income for six months ended April 30 was $9,129,000 as compared with $6,254,000 for the like period a year ago.

Paper mill corporate changes

Miami Valley Coated Paper Co. has been acquired by a group headed by Frank Schulman, president of *Kupfer Bros. Co.*, but will be operated under the old name by the new owners.

Minnesota & Ontario Paper Co. has put into effect a two-for-one split of its common stock with an increase in the dividends.

Park Tissue Mill Inc. and *Frost White Paper Mills Inc.* have been sold to a new group with Leif B. Nostrand as president of the combined unit.

Riegel Paper Corp. is giving its common stockholders an opportunity to buy 194,155 shares of additional common stock at the rate of one new share for each five shares previously held. The price of $30 will produce funds for the company's expansion in the South.

Scott Paper Co. is refinancing its bank loans and securing additional capital by an issue of $98,685,100 in new convertible debentures. Stockholders will be able to buy the new debentures at the rate of $100 for each eight shares of common stock.

United States Envelope Co. has voted a five-for-one split of both the common and preferred shares.

Stock and Bond Quotations

New York Stock Exchange — Stocks

Closing Prices	June 11, 1956	May 10, 1956
A. P. W.	°47⅞-5¼	5½
Celotex	41⅞	46¼
Same Pref.	°193⅛-193¼	191½
Certain-Teed Products	29½	29⅞
Champion P & F	79¼	80½
Same Pref.	°104⅜-107½	103½
Chesapeake Corp.	39	37¾
Container Corp.	80	86½
Same Pref.	°99-101	°100-104
Crown Zellerbach	65	66
Same Pref.	103	°102¾-103½
Dixie Cup	55½	58
Eastern Corp.	32¼	33⅞
Federal Paper Board	33	35⅝
Fibre Paperboard	40	40⅜
Same Pref.	123¾	127
Robert Gair	29¼	32
Same Pref.	110	110¾
Great Northern	100	103
Hammermill	35	38⅜
International	132¼	134⅜
Same Pref.	102½	102½
Kimberly-Clark	50⅜	53
McAndrews & Forbes	43½	44¾
Marathon	38⅝	45⅞
Masonite	44½	46
Mead Corp.	35½	80
Same Pref.	°101-102½	°100-101½
Same Second Pref.	°78-91	°88-92½
Minnesota & Ontario	35¼	40
National Container	32⅜	34⅛
Same Pref.	56½	59
Oxford Paper	45½	48
Same Pref.	100	°98¾-101½
Rayonier Inc.	34⅞	37¾
Riegel	36¼	39
Scott Paper	67¾	72½
Same $3.40 Pref.	°95-97	°93½-95
Same $4.00 Pref.	°100-102	°102½-104
St. Regis Paper	50¼	52¼
Same Pref.	°102¼-103	°102½-103¼
Sutherland	43½	46¼
Union Bag & Paper	39⅝	44⅛
United B. & C.	23	25¼
United Wallpaper	2⅛	2⅜
Same Pref.	°25-27	24
U. S. Gypsum	64¾	66½
Same Pref.	°174½-177	°172½-174½
West V. P. & P.	58	59¾
Same Pref.	105⅜-106	°105¼-106

New York Stock Exchange — Bonds

A. P. W. 5%	80½	—
Champion P & F Co. 3¼%	99	—
Mead Corp. 3%	101	—

American Stock Exchange — Stocks

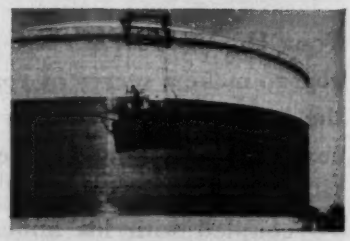
American Writing	°21½-23½	23
Brown Company	20½	22¾
Puget Sound	59	67¼

°Closing Bid and Asked Prices.

REMARKABLE PRELOAD TANK

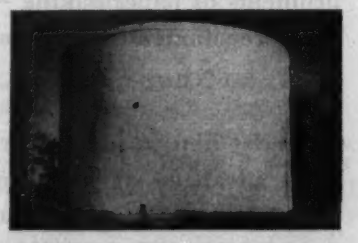
SAVED 70% STEEL 30% CONCRETE

Concrete bonded with high tensile wire reinforcement applied by the PRELOAD SYSTEM with a tension of 140,000 psi permits these tremendous material savings and more. PRELOAD tanks are suitable for the many process and storage tanks required by the paper manufacturing industry.



PRELOAD ADVANTAGES

- Maintenance-free structure. Nothing to deteriorate or protect.
- PRELOAD experience in building over 1,000 tanks.
- Lowest ultimate cost over steel or conventional concrete construction.
- Technical data and literature on PRELOAD design and construction available on request.



PRELOAD TRADE MARK

The Preload Company, Inc.
211 EAST 37th STREET
NEW YORK 16, N. Y.

Photo courtesy of Great Northern Paper Company.

FELT COSTS too HIGH?

A mill survey by your
HUYCK FIELD SERVICE ENGINEER
will help you find the reason why

Your Huyck Field Service Engineer will be glad to make a survey of your mill, spending the necessary time it takes to help you uncover causes of high felt costs or troubles. His knowledge of felts and their application — coupled with his understanding of the problems of papermaking — enables him to make recommendations that will help you.

To assist him in his survey . . . he uses the most advanced of precision instruments to determine exact measurements of felt running length and tension . . . make moisture tests . . . check synchronization of machine parts . . . and provide other information pertinent to the manufacture of your paper.

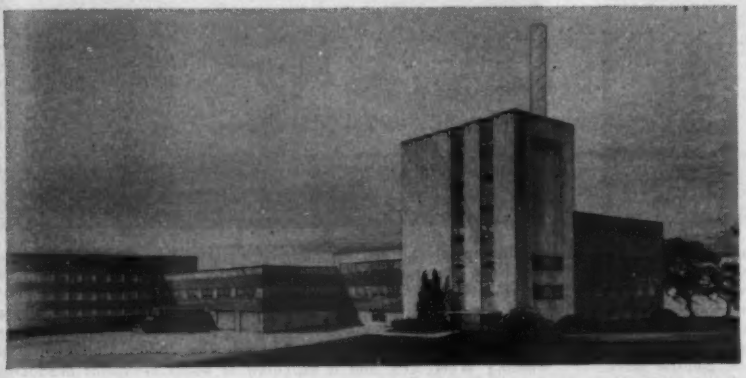
Many mills are gaining advantages and economies by having their Huyck Field Service Engineer make surveys regularly. You, too, will find this Huyck service helpful in producing better paper at lower cost per ton; it's the largest and best equipped Field Service Organization in the industry.

NEW!
HUYCK FELTS

FIRST IN QUALITY FIRST IN SERVICE

F. C. HUYCK & SONS • Established 1870
Rensselaer, New York • Alicoville, Alabama
Peterborough, New Hampshire • Cavendish, Vermont
IN CANADA: KENWOOD MILLS LTD.
Arnprior, Ontario • Established 1918

NEWS of the INDUSTRY



ONE OF THE HIGHEST pressure industrial steam boilers in the country will be installed in the 10-story building above as a part of Consolidated Water Power & Paper Co.'s expansion program at the Biron Div. in Wisconsin Rapids. The 1450-lb. boiler and a 15,000-kw turbine are designed to meet the power requirements of the high-speed enamel paper machine and auxiliary facilities scheduled for operation by June 1957. The new machine will increase the firm's enamel paper capacity by 30 per cent and will be housed in the building shown in the left background. Cost of the facilities is estimated at $13,500,000

Further North American Expansion for Bowater

Plans for two new North American pulp mills—one in the United States and one in Canada—plus expansion of existing U. S. newsprint manufacturing facilities have been announced through Bowater Paper Corp. Ltd. of London, Eng.

The firm expects to begin construction immediately on a sulfate pulp mill near Rock Hill, S. C. Initial annual capacity is to be 100,000 tons, and at a later date a mill for the manufacture of packaging papers may be undertaken on the same site.

The decision to build the new mill was induced by the increased demands on existing pulp resources at Bowaters Southern Paper Corp.'s mills in Calhoun, Tenn., coupled with the growing pulp requirements of other Bowater mills.

During 1955 production at the Tennessee mills reached an annual rate of 200,000 tons of newsprint and 75,000 tons of sulfate pulp. A new No. 3 machine, which is to be in operation before the end of the year, will raise Calhoun newsprint capacity to more than 300,000 tons.

"A fourth newsprint machine is now under serious consideration," according to Sir Eric Vansittart Bowater, chairman of Bowater Paper Corp., "and its production has already been sold on an if-and-when basis."

In addition, Bowaters Fibreboard Co. Inc., which was organized last year, plans to construct a $4,500,000 mill at the Calhoun site with an annual capacity of 120,000,000 sq. ft. of building board.

To secure essential supplies of pulp for increased newsprint production the Bowater organization is enlarging its pulp mill capacity in Scandinavia, Canada and Britain and "has also decided in principle to construct a groundwood pulp mill in Canada with an annual capacity of 100,000 tons."

St. Regis Plans $330,000 Laboratory at Pensacola

Construction of a pulp and paper laboratory will be undertaken this fall at Pensacola, Fla., by St. Regis Paper Co. The building, which will also house the plant engineering staff, will cost approximately $330,000.

Installed in the lab will be the latest equipment for making chemical analyses of wood chips, pulps and papers. Tappi atmospheric condition standards will be maintained in areas for testing the physical strength of pulps and papers: 50 per cent relative humidity and 73°F.

Pulping research will be conducted on the utilization of short-fibered wood, while studies will also be made to determine the optimum pulping methods for hardwoods. Much work will be directed toward the development of new paper grades, particularly for bleached and unbleached kraft paper and board.

Development activities will include evaluations of all raw materials such as water, salt cake, lime and bleaching agents for pulp and chemical additives or treatments for paper.

The facility will transfer basic laboratory studies into pilot plant scale operations and further into commercial production. Also to be studied is the development of by-products of the kraft manufacturing process.

CZ Operates Pilot Plant

Crown Zellerbach Corp. at Camas, Wash., has put into operation a pilot plant designed to produce dimethyl sulfide from lignin and other materials left over from the manufacture of kraft pulp.

The plant, employing a Swedish process for which CZ has exclusive license in the United States and Canada, has an eventual yearly capacity of 2,000,000 lb. It is expected that dimethyl sulfide will be produced in larger quantities and at lower cost than has been possible heretofore. (Dimethyl sulfide can be used as a sulfur carrier in agricultural and rubber chemicals, as a base for certain solvents and as an odorant or masking agent.)

Union Bag and Camp May Combine

Union Bag & Paper Corp. of New York, N. Y., and Camp Mfg. Co. Inc. of Franklin, Va., have reported that their respective directors have approved in principle a plan for the combination of the two firms.

Under the proposal the corporations would be either merged or the assets of Camp acquired by Union in exchange for the latter

EXTENSIVE EXPANSION PROJECTS now underway at Powell River Co. Ltd.'s mills in British Columbia include the recent speed-up of No. 7 paper machine (1). The changeover involved such installations as a new vacuum couch transfer (shown in the photo), a pressure-type head box with variable speed fan pump motors, selectifiers to replace Bird screens, a new and longer (102 ft. 3 in.) fourdrinier, a new saveall filter and a new General Electric drive.

No. 7 was running at 1550 fpm when it was shut down for the rebuilding job. Fifteen days later it was started up at 1610 fpm and has been running steadily and efficiently since. Speed is being increased slowly and methodically

At the right is an over-all view of the Powell River, B. C. operation showing the advanced stage of construction of the ninth paper machine room in the left foreground. The 262-in. Dominion Engineering Works Ltd. unit is expected to boost newsprint production by 25 per cent to 500,000 tons in 1957

firm's stock. (All Camp liabilities would be assumed by Union Bag.) In either case, Camp shareholders would receive 1.75 shares of Union Bag capital stock for each share held.

The corporate name of the combined company is to be Union Bag-Camp Paper Corp., which would comprise four major divisions: Union Bag & Paper Div., Union Board & Box Div., Union Chemical Div. and Camp Div.

According to Alexander Calder, Union Bag's board chairman, "Our sales have been principally to users of unbleached kraft paper, paper bags, board and boxes. With the acquisition of . . . Camp, we enter the bleached kraft paper field."

Camp in 1953 completed one of the most modern bleach plants in the industry and at present produces a daily 375 tons of pulp, paper and board. It expects to boost production to 425 tons by September.

If the combination is approved, Union Bag-Camp plans an $18,000,000 expansion at Franklin that will bring daily production up to 600 tons. The increased capacity will be altogether for the production of bleached grades.

USG Mill Sets Record

In a record nine months after ground-breaking, the new Houston, Texas mill of United States Gypsum Co. is in operation.

Smashing all known records for construction and start-up, the paperboard plant turned out its first product January 24. All major papermaking equipment was supplied by Black-Clawson Co. The Paper Machine Div. furnished the complete 121-in. eight-cylinder board machine, while the Shartle Div. supplied the stock preparation system. Engineering and construction was handled by Brown & Root Inc. of Houston.

NY & Penn Shuts Down Old Cylinder Machine

The old 60-in. cylinder machine at the Lock Haven, Pa. mill of New York & Pennsylvania Co. will make way for the firm's concentration on the production of fourdrinier papers. The 66-year-old firm announced that the machine would be shut down probably in July.

Motivating the move, according to the firm, is the desire to make additional fourdrinier paper tonnage. The Pusey & Jones Corp. unit is the only cylinder machine now operating at Lock Haven.

60-INCH cylinder machine that is to be shut down by New York & Pennsylvania Co.

Budget Automation Seen for Pulp, Paper Industry

Automation will increase sharply in the pulp and paper industry this year—and at budget prices.

Speaking at a Chicago conference of the Armour Research Foundation, Harold A. Sholl of Minneapolis-Honeywell Regulator Co. declared that pulp and paper-makers can automate their processes for no more than 2 per cent of their individual plant equipment expenditures.

Sholl, who is the pulp and paper industry manager for M-H's Industrial Div., declared that this advanced application of automation would take the form of high-speed data logging, scanning and computing systems tied in with conventional forms of instrumentation.

He described a hypothetical 200-ton mill which could be fully automated, as far as today's science goes, for about $500,000.

From an employee standpoint, Sholl emphasized that instrumentation is necessary to automatically control constantly changing conditions in paper and pulp processing. The human worker has neither the agility nor the ability to cope with these rapidly changing factors. In addition, it eliminates the factor of job monotony.

New York Times Finds Ways To Tighten Its Waste Line

Last year the New York *Times* used 181,542 tons of newsprint. This year's estimate calls for more than 197,000 tons, an expansion trend apparent throughout the newspaper business which has resulted in the current shortage of newprint.

The Times also estimated that 11,000 tons of newsprint a year go into papers that are not sold to readers. Steps have already been taken to reduce this figure at every known point of loss. It is known, for example, that 620 tons go into papers that are distributed as work copies and to homing night employees. Another 5400 tons of paper are work-a-day waste in the press and mail rooms. There is an additional 3300 tons in "white waste" (caused mostly by injury in transit and newsprint roll-handling damage).

In addition to traceable loss by waste, about 1780 tons of printed issues a year — involving over $250,000 worth of newsprint — can't be accounted for and apparently just evaporate.

The Times' conservation committee began its work in February, has concentrated its efforts in the reel room (where newsprint is stored before it is wound into the presses); in the press room, and in the mail room. It is in these spots that newsprint and printed papers are handled in bulk, where the greatest waste can occur.

Reprinted from *Times Talk*

By tightening operations such as those shown in the pictures, 85 tons of newsprint were saved in the press room alone during the first seven weeks of the drive.

A certain amount of each day's press run is bound to be over and above reader demand, but these extra copies must be run off just the same. More copies must be distributed to newsstands than can be sold on any given day so that the Times will be available to purchasers late in the day as well as first thing in the morning. Uncontrollable factors, such as the weather, sharply affect newspaper sales, too, and may cause sellouts in one place and surplus copies in others. Whatever news dealers don't sell are called "returns" and do not count in circulation figures. Neither are they included in the waste category. The extra papers must be printed.

Employees outside the press and mail rooms have felt the pinch mostly in cutbacks in the number of free (work) copies passed out to their departments. Previously, papers were doled out rather lavishly. Now each department head has been asked to requisition only the bare minimum necessary to his staff as work copies.

Free copies—excepting surplus—cannot be listed entirely as "waste". But in the course of a year the amount of newsprint that goes into them is more than enough to put out three complete weekday editions.

Roll core (top) is stamped with red ink so it can be run to very end before (bottom) fresh roll is pasted on. Note empty roll, lower left

A full roll of newsprint has been placed in a prominent position in the main lobby of the Times Building to impress everyone with the need for cooperating in paper conservation. It faces the main doors and bears a placard telling briefly how many more copies of the Times could be put into circulation if all points of loss could be tightened.

(Turn to page 323)

Damaged part of roll (l) is cut away; old method stripped entire roll of newsprint to damage depth. Only pasty newspapers (c), occuring where newsprint rolls join, are removed; checker returns dry copies. Good copies (r) are salvaged from choked-up conveyor between press and mail rooms. Such measures saved 85 tons of newsprint in the first seven weeks of the conservation drive

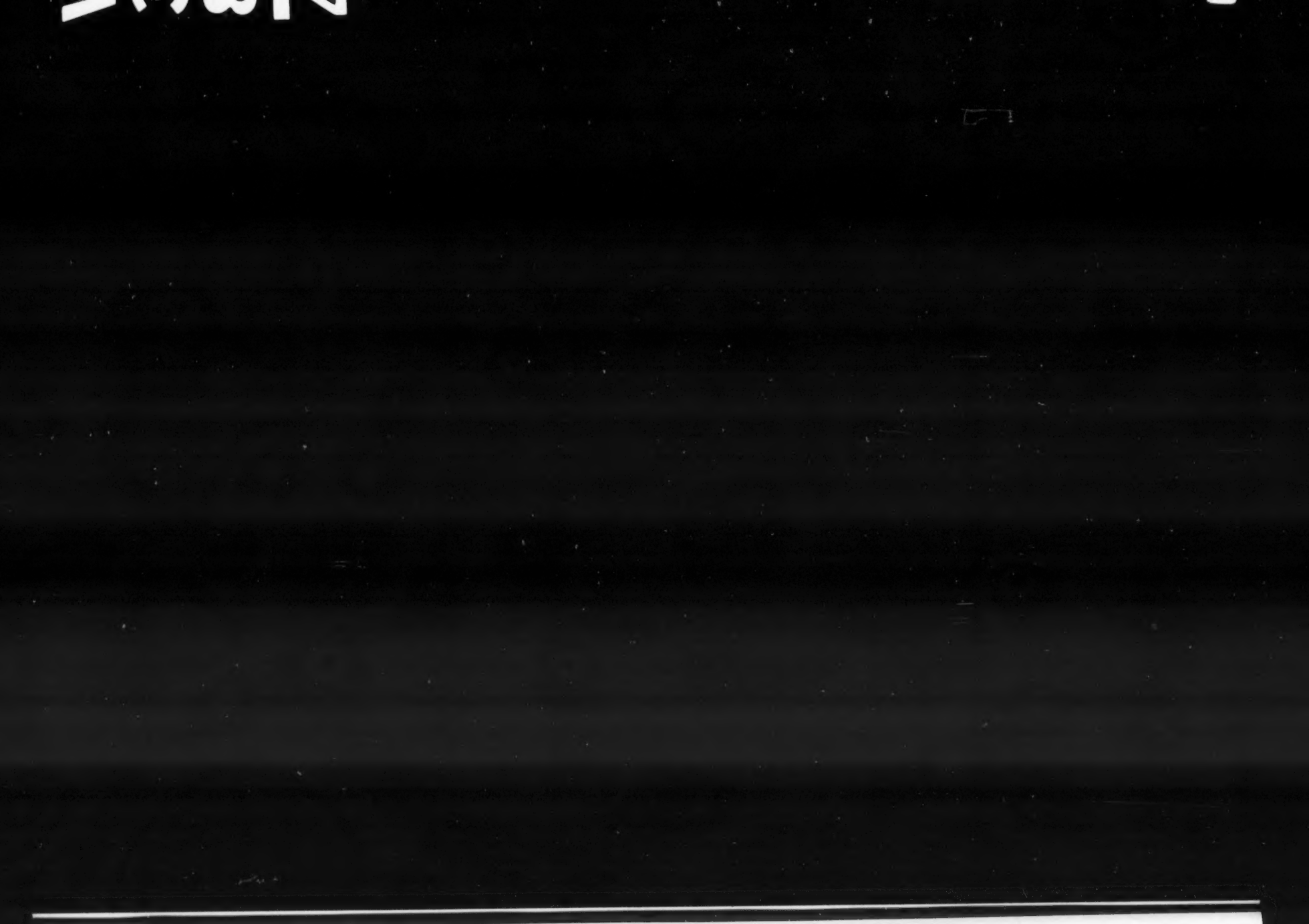
The machine that produced a commercially acceptable sheet a few decades ago may fail to meet the new demands of today's competitive market. Or if quality is pushed higher, production may be too slow for profitable operation.

A new Puseyjones Machine can give you the high quality paper you want, in greater tonnage, with better profits. And your Puseyjones Machine is your assurance of meeting tomorrow's still higher production demands. That's because the finding of new pathways to increased speeds and larger profits is a 90-year-old tradition at Puseyjones.

When you need a new machine . . . or the modernization of an old one . . . you need the help of Puseyjones engineers. That help is yours for the asking. Call or write us today.

THE SIGN OF TRADE MARK SUPERIOR QUALITY

THE PUSEY AND JONES CORPORATION
Established 1848 : : Builders of Paper-Making Machinery
Fabricators and Welders of all classes of Steel and Alloy Products
Wilmington 99, Delaware, U.S.A.



News of the Industry . . .

Drought Over, CZ Resumes Ocean Falls Operations

Resumption of full newsprint production at the Ocean Falls, B. C. mill of Crown Zellerbach Corp. has been announced by the firm. The winter slow-down was caused by an unusual water shortage.

Power supply for the Ocean Falls plant—300 miles north of Vancouver—is Link Lake, which dipped to record low levels as a result of the winter "drought" in an area where precipitation is normally heavy.

During the power crises CZ instituted emergency measures that enabled production to continue at a decelerated pace. Included were the use of steam instead of hydro-electric power; importation of wet lap pulp and side runs and reject rolls from other Pacific Coast mills; reduction in sawmill operations and some curtailment in pulp manufacture; increased use of chips, and retention of a commercial rain-making firm.

Six-Point Program Outlined for Paper Distributors

A six-point program was outlined recently for paper distributors as a way of assuring themselves a fair share of new markets. Speaking at a meeting of the Empire State Paper Association in Syracuse, N. Y., Clem W. Kohlman declared that new markets are fast appearing with the development of new paper products. Kohlman is advertising manager of the Industrial Chemicals Div. of American Cyanamid Co.

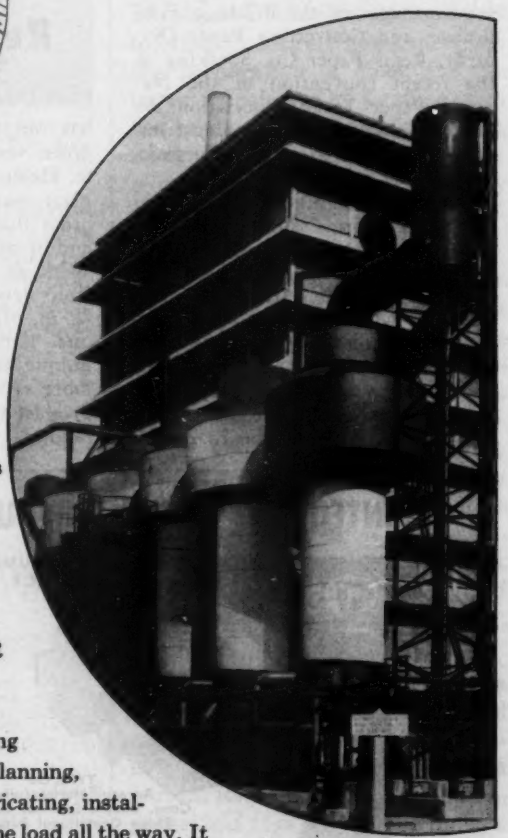
The six points as outlined by Kohlman are: (1) keeping aware of the new paper products and their progress; (2) learning about new markets for paper and how to get to them; (3) studying customers' needs and informing suppliers accordingly; (4) determining the adaptability of the new papers and new products to hitherto unthought of uses; (5) learning more about the products they sell, and (6) training salesmen to be creative and imaginative.

During his talk Kohlman presented the results of a recent questionnaire answered by more than 700 paper merchants. The returns showed that most paper merchants want more of the paper market than

We'll shoulder the entire load . . .

from design

. . . to finished product!



Goslin-Birmingham's complete, integrated organization is always at your disposal. Our process engineers are available for prompt, on-the-spot technical consultation and planning. G-B takes YOUR processing problem and comes up with the solution . . . from planning board to installation. Planning, designing, casting, fabricating, installing . . . G-B shoulders the load all the way. It will pay to solve your processing problems the G-B way.

The illustration shows a Goslin-Birmingham six-body sextuple effect evaporator of advanced design at the Halifax Paper Co., Roanoke Rapids, N.C.

G-B Engineers are at your service any time to discuss your processing problems . . . without cost or obligation.

GB

GOSLIN-BIRMINGHAM
MANUFACTURING CO., INC.
BIRMINGHAM • • ALABAMA

they now have, especially in the face of the growing competition not only between paper merchants themselves, but also from distributors in other fields who are carrying paper items in addition to regular lines.

Fine Papers in Packaging

"New uses for fine papers are fast appearing," according to Joseph H. Torras, assistant general sales manager of the Printing, Publication and Converting Paper Div. of St. Regis Paper Co. Speaking at the recent convention of the National Paper Trade Association, he declared that, "one of the most important of these uses is in the packaging field."

The most significant change in packaging, Torras said, has been the addition of the function of merchandising for the package. Packages that must sell themselves are designed with primary emphasis on the merchandising angle.

"Finest quality papers, on which there are no printing problems," he declared, "are combined with the most inexpensive paperboard at considerably less cost than would be incurred using the high-quality coating boards required for fine screen printing. Torras added that the future must show which trend will dominate—laminating or the coating of heavy material such as boxboard.

"Should laminating dominate," the speaker continued, "the type of paper that could be used would be determined in large part by the type of printing to be used. . . . The trend would seem to be toward offset papers, with letterpress papers taking second place.

"The trend definitely seems to be toward coated papers with high gloss. The ratio between coated and uncoated papers sold last year was 2-to-3, continuing a strong trend toward coated.

"Additional new uses for fine papers may well also be found in the packaging field, where they will be combined with metal foils and plastics to make containers of high merchandising value."

Recent Expansions in the Industry

Crown Zellerbach Corp.
has shipped the first carload of green veneer from its new mill in St. Helens, Ore. The start-up of the plant marks CZ's first venture into other than pulp and paper products and by-products in the United States. With an annual capacity of veneer equivalent to 90,000,000 sq. ft. of ⅜ in. plywood, the mill is running one lathe, three clippers and a unique tray system that enables a more complete recovery of raw product than has ever been possible before.

Kimberly-Clark Corp.
of Neenah, Wis., has announced purchase of Reed Paper Hygiene Ltd., a British converter of paper towels for industrial and domestic use. The transaction was made through K-C's British subsidiary, Kimberly-Clark Ltd., in order to widen the company's product range in British and foreign markets.

Container Corp. of America
has broken ground at Santa Clara, Cal., for a boxboard mill and storage warehouse. Scheduled to start operations in July of next year, the mill will have a top daily production of 150 tons of high-grade folding boxboard and linerboard. A feature will be the first use of conveyors to service the Hydrapulpers.

Flintkote Co.
will build a gypsum-processing plant at Sweetwater, Texas, to manufacture gypsum board, plaster and other gypsum materials. The firm has acquired a large deposit of gypsum at the site and will begin plant construction in the late summer or early fall.

Kalof & Co.
has opened its new $1,500,000 paperboard mill at Port Hueneme, Cal., with a daily capacity of 115 tons. Patterned after a Swedish plant, the mill can have an ultimate capacity of 200 tons. Operating the installation is Robert W. Stevens, paper mill consultant.

National Container Corp.
announces that it now owns 100 per cent of Northeastern Container Corp., operator of a fully integrated corrugated paper shipping container plant at Bedford, Pa. Two

INTEGRITY COUNTS in PUMPS, Too

This DISTINGUISHED PUMP
will win your RESPECT
TYPE OJ
Aurora® Horizontally Split
Case, Double Suction, Single
Stage Centrifugal Pump
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NEW GLASSINE PAPER mill recently put into operation by R-W Paper Co. at Longview, Wash. In the left background is the Weyerhaeuser Timber Co. mill, from which R-W draws its pulp under long-term contract.

R-W in Production

R-W Paper Co. of Longview, Wash., produced its first sheet of glassine early in June. Construction for the joint venture of Weyerhaeuser Timber Co. and Rhinelander Paper Co. was started in January 1955. (Rhinelander recently became a subsidiary of St. Regis Paper Co.)

Said to be the most modern mill in the country for the manufacture of glassine and greaseproof papers, R-W boasts the largest paper machine producing these specialty grades. Embodying the latest engineering and quality control features, the plant is located adjacent to Weyhaeuser's pulp mill, from which it draws its wood pulp in slush form. Annual productive capacity is approximately 14,000 tons.

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corrugating machines are in operation.

Chesapeake Corp. of Virginia
is installing a complete continuous cut trim, scrap collection and conveying system for its new finishing room at West Point, Va. The entire system, which will serve the rewinders and sheeter machines, was designed and built by J. O. Ross Engineering Corp.

Ohio Paper Co.
of Miamisburg, Ohio, has purchased the controlling interest in a new dry roofing felt mill being constructed at Little Rock, Ark., by Southern Asphalt Roofing Co.

Waskesiu Forest Products Ltd.
is a newly organized firm that will construct a $60,000,000 sulfate pulp mill near Prince Albert, Sask. Initial capacity is slated to be 210,000 tons annually, with production scheduled to begin not before 1958. Principal figure in the project is Robert G. Campbell of Vancouver, who heads R. Campbell & Asoociates.

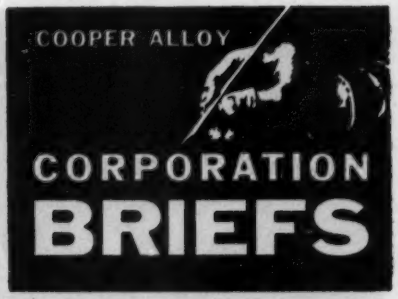
Consolidated Paper Corp. Ltd.
will build a $1,000,000 research center at Grand Mere, Que., and at the same time increase its research and development staff.

Pulpwood Development Co. Inc.,
a newly formed firm at Halls, Tenn., has reported plans for a $35,000,000

Alaska Pine & Cellulose Ltd.
of Port Alice, B. C., has ordered a 175-in. pulp drying machine from Black-Clawson Co. at Watertown, N. Y. Installation is scheduled for early 1957. The unit, the structure in which it will be housed and necessary auxiliaries will cost approximately $5,000,000.

Allied News Briefs . . .

Joseph T. Ryerson & Son Inc. held open house at its steel service plant in Chicago June 7, 8 and 9. This was said to be the largest open house ever attempted by any company in the Chicago area. The company, established in 1911, has since grown to a nation-wide group of 17 steel service plants. The com-



Edited by GEORGE BLACK

DOUBLE-D REFINER
The Jones Double-D Refiner is said to bring an entirely new concept to the preparation of stock for the paper machine. Key to the design lies in the twin refining area with its double discs. For a more complete story ask for the February issue of Cooper Alloy NEWSCAST.

WHAT'S IN A TRADEMARK
Behind the Cooper Alloy trademark, cast or stamped into our stainless steel fittings, stands more than a quarter century of experience and the most complete production facilities in the industry. When you specify Cooper Alloy fittings you can be sure that every step from design to shipment is under the supervision of specialists. Look for the CA trademark before you buy . . . it is a sign of quality, experience and reliability.

DESIGN FEATURES FEATURED
Design features that have made the Cooper Alloy stainless steel valve the preferred valve for chemical processing are presented in the current issue of NEWSCAST. Diagrams and text combine to make a thorough presentation. Additional copies available on request.

NEW PUMP IN DEMAND
The new line of stainless steel rotary pumps announced by our Vanton Pump Division has taken the field by storm because it is the one (and only) pump of its kind without stuffing boxes or shaft seals. Bulletin VP561 gives the facts. Write for it today.

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2319 Hamilton Rd.

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465 California

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111 Sixth Street

PHILADELPHIA, PA.
328 E. Chelten Ave.

pany recently announced the purchase of property at Indianapolis, where its 18th plant will be built and is expected to be in operation in early 1957.

Whiting Corp. (Canada) Ltd., a subsidiary of Whiting Corp. of Harvey, Ill., has announced the purchase of Volta Mfg. Co. Ltd. of Welland, Ont. Volta will continue to manufacture its line of electric furnaces, smelters and similar equipment. In addition, Volta will handle the complete Whiting line.

Cooper Alloy Corp. is expanding its facilities at plants in Hillside and Clark Township, N. J. The firm, manufacturer of stainless steel castings, fittings, valves and rings, will spend about $500,000 in the project.

American Cyanamid Co. and **New Jersey Zinc Co.** have announced that an agreement of sale entered into in March 1954 has been carried out. American Cyanamid's Gloucester City, N. J. titanium dioxide pigments plant was formally turned over to New Jersey Zinc following completion of ACC's new operation in Savannah, Ga.

Farrel-Birmingham Co. Inc. of Ansonia, Conn., has moved its Chicago offices to new and larger quarters at 10725 South Western Ave.

Paisley Products Inc. has expanded further into the West Coast market through the acquisition of Dilco Products Inc. of Redwood City, Cal. The new unit brings Paisley's adhesive-producing facilities to a total of five plants.

Warren Steam Pump Co. Inc. of Warren, Mass., has named George E. Swett & Co. of San Francisco to handle sales in the San Francisco area. Warren representative in Los Angeles is Gil Moore & Co.

Cameron Machine Co., Brooklyn, N. Y., has been sold. The company has been purchased by a group headed by Wilson M. Compton Jr., who has been appointed president.

Coming Events

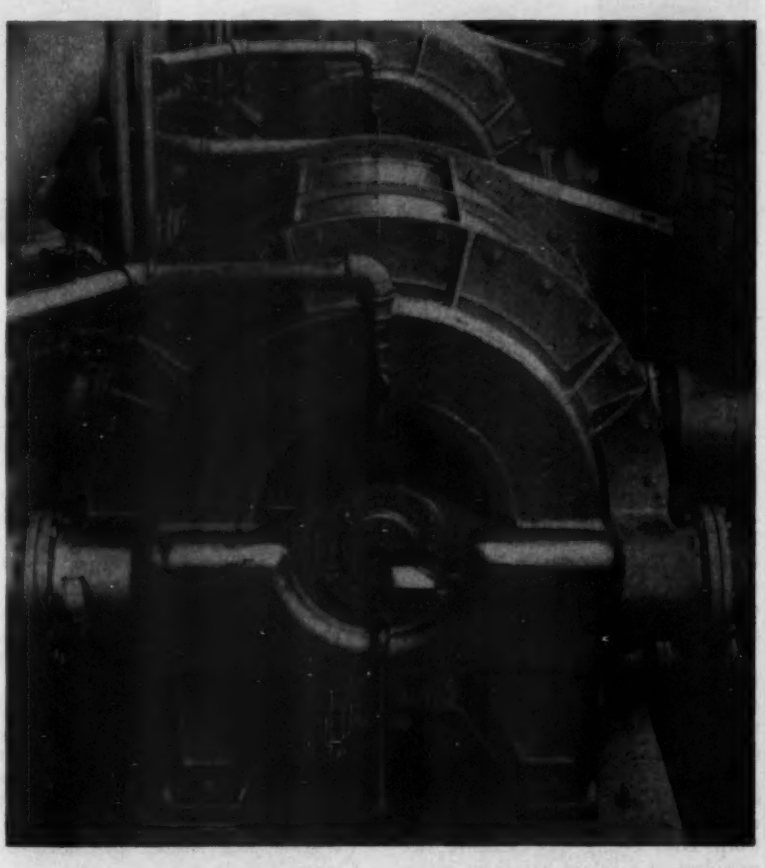
Tappi

July 24—Kalamazoo Valley (joint meeting with Michigan Superintendents), Gull Lake Country Club, Kalamazoo

American Pulp & Paper Mill Superintendents Association

July 24—Michigan (joint meeting with Kalamazoo Valley Tappi), Gull Lake Country Club, Kalamazoo

High machine speeds? High temperature headbox stock? You need NASH Vacuum Pumps!



Air from the suction rolls on paper machines carries with it substantial quantities of moisture. This considerably reduces the effective air handling capacity of any vacuum pump except the Nash. In the Nash Vacuum Pump, because of the unique principle of operation, the bulk of this vapor is effectively condensed inside the pump. The total capacity of a Nash is therefore increased.

When you specify a Nash Pump it can be closely sized to the job. It is not necessary to select an over-sized unit, because the rated capacity of the Nash may be relied upon.

That is one of the reasons why Nash Vacuum Pumps are installed in over a thousand leading Paper Mills. An engineer from Nash will be glad to survey your mill, and make recommendations, entirely without obligation to you.

NASH ENGINEERING COMPANY

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NAMES in the NEWS

P. T. Sinclair

E. W. Erickson

G. H. Gallaway

H. F. Carpenter

Crown Zellerbach Management Changes

Crown Zellerbach Corp. officials in both the United States and Canada have announced a series of management changes:

Peter T. Sinclair, formerly vice president for manufacturing in San Francisco, has been elected president and chief executive officer of Crown Zellerbach Canada Ltd. in Vancouver, B. C. He succeeds Frank N. Youngman, who continues to serve as chairman of the board and of the executive committee.

E. W. Erickson, formerly assistant vice president for engineering and construction at San Francisco, becomes vice president for manufacturing and construction.

Ventrees Young becomes vice president of CZ and manager of mill operations for the Gaylord Container Corp. Div. Young was executive vice president of Gaylord before its merger with Crown Zellerbach last fall.

G. H. Gallaway, manager of the Crown Zellerbach mill in Camas, Wash., has been appointed assistant vice president for manufacturing and converting in San Francisco.

H. F. Carpenter, manager of the Port Angeles, Wash. newsprint mill, becomes manager of printing papers production in San Francisco. F. O. Boylon, assistant Camas manager, becomes manager; while F. W. Flynn, assistant manager at Port Townsend, Wash., becomes manager at Port Angeles.

In a change in CZ's expanded waxed paper division, David Benjamin, formerly president of Waxide Paper Co. in Kansas City, Mo., was promoted to assistant general manager of CZ's Waxed Paper Division. (Waxide was recenty purchased by Crown Zellerbach.)

W. A Young

D. W. Maxon

Ohio Boxboard Elects

Wayne A. Young has been elected chairman of the board and chief executive officer of Ohio Boxboard Co. of Rittman, Ohio. Young, who has been president of Ohio Boxboard and Ohio Injector Co. since 1934, succeeds his father, the late E. J. Young, who founded both firms at the turn of the century.

Dudley W. Maxon, former executive vice president and general manager, has been named president and chief administrative officer. Succeeding Maxon as executive vice president is J. N. Andrews, since 1953 vice president and general manager of the Carton & Board Div.

Robert T. Elias, formerly an associate professor at Western Michigan College in Kalamazoo and at one time chief chemist for Whiting-Plover Paper Co., has been named technical director for the new Racquette River Div. of Orchard Paper Co.

E. Howard Smith has been elected president of Canada Paper Co. and its subsidiaries to succeed the late Harold Crabtree. Smith is president of Howard Smith Paper Mills Ltd.

John W. McNichol, plant manager for Scott Paper Co. in Chester, Pa., has assumed additional executive responsibilities. He will serve as executive assistant to the vice president at Scott's Mobile, Ala. plant, where the firm now has a $20,000,000 construction project underway.

Doeskin Products Inc. has promoted **H. W. Rowan** to the post of plant manager at Rockland, Del. He formerly held a similar position at Wheelwright, Mass. Named production manager at Wheelwright is **Joseph Collingwood.**

John Strange Paper Co. has appointed four new officers: **J. M. Levin,** vice president; **E. J. Deprez** to succeed Levin as secretary; **L. A. Blume,** treasurer to succeed Harrison Smith, and **Arthur P. Remley** was named to the new post of assistant secretary.

Eastern Corp. has reported the following changes at the Brewer, Maine mill: **George G. Marsanskis,** superintendent of the making department; **Paul I. Coughlin,** assistant superintendent, and **Peter Millett,** beater room supervisor.

Carl L. Anderson has been made assistant paper mill superintendent for Hammermill Paper Co. at Erie, Pa. He was formerly technical coordinator for material preparation.

Erick Zimmerman, general superintendent of Chesapeake Corp. of Virginia, has been elected a vice president and production manager.

W. Clyde Baggs has been named general manager of the Mills Div. of Bathurst Power & Paper Co. Ltd. He was at one time mill manager at Bathurst, N. B.

Carl A. Gustafson, chief of the Division of Fire Control since 1948, has been named general inspector for the Washington, D. C. office of the U. S. Forest Service. He will be succeeded by **Merle S. Lowden,** since 1951 assistant regional forester in charge of state and private forest land activities in the North Central Region.

Allied Personalities . . .

Three new managerial sales appointments have been announced by the Paper Makers Chemical Department of Hercules Powder Co.: **Robert R. Buss,** formerly acting manager of the Wilmington sales district, as district manager at Kalamazoo; **Edwin R. Fait,** formerly a technical representative, as Wilmington district manager, and **Howard H. Parker,** for the past several years a technical sales representative, as Kalamazoo assistant district manager.

American Cyanamid Co.'s Industrial Chemicals Div. has named **George W. Russell** general manager and **Alden R. Loosli** assistant general manager. Mr. Russell, formerly assistant general manager of the Pigments Div., has been with the firm since 1946.

Frank S. Winship, formerly mill engineer for Personal Products Corp., Milltown, N.Y., is the most recent addition to F. C. Huyck & Sons' field service engineering staff.

Necrology . . .

L. F. Dixon

L. F. Dixon, who retired recently as general manager and vice president of Ecusta Paper Corp., died June 6. Mr. Dixon helped to start the cigarette paper manufacturing industry in the United States. He was joint author of many publications on tobacco and tobacco disease and held patents on tobacco treatment.

Harvey B. Mann, founder of Mann Engineering Co. of Pittsburgh, died suddenly May 19. Mr. Mann founded the firm in 1936. The company is a sales organization which represents Fuller Co.

Wilhelm B. Bronander Sr., president of Scandia Mfg. Co., North Arlington, N. J., died May 19 after a long illness. Mr. Bronander, holder of over 190 patents, founded Scandia in 1918.

Arthur A. William, 78, board chairman of Graton & Knight Co. of Worcester, Mass., died June 9 at his North Grafton home. He joined the 105-year-old firm in 1937 and became a director the following year. He was elected chairman of the board in 1942 and president in 1944. Mr. Williams was among the first to develop a safety shoe and had been awarded a medal by the National Association of Manufacturers for that accomplishment.

Thurman O. Day Jr., works manager of the Milwaukee plant of Milprint Inc., died suddenly May 22. Mr. Day was previously plant superintendent and was appointed works manager in August 1955.

H. H. Schiffer, supervisor of the finishing and shipping department of John Strange Paper Co., where he was employed for 35 years, died June 9 after a short illness.

Mrs. Helen Kimberly Stuart, 87, daughter of John A. Kimberly, one of the founders of Kimberly-Clark Corp., died in May at her Neenah, Wis. home.

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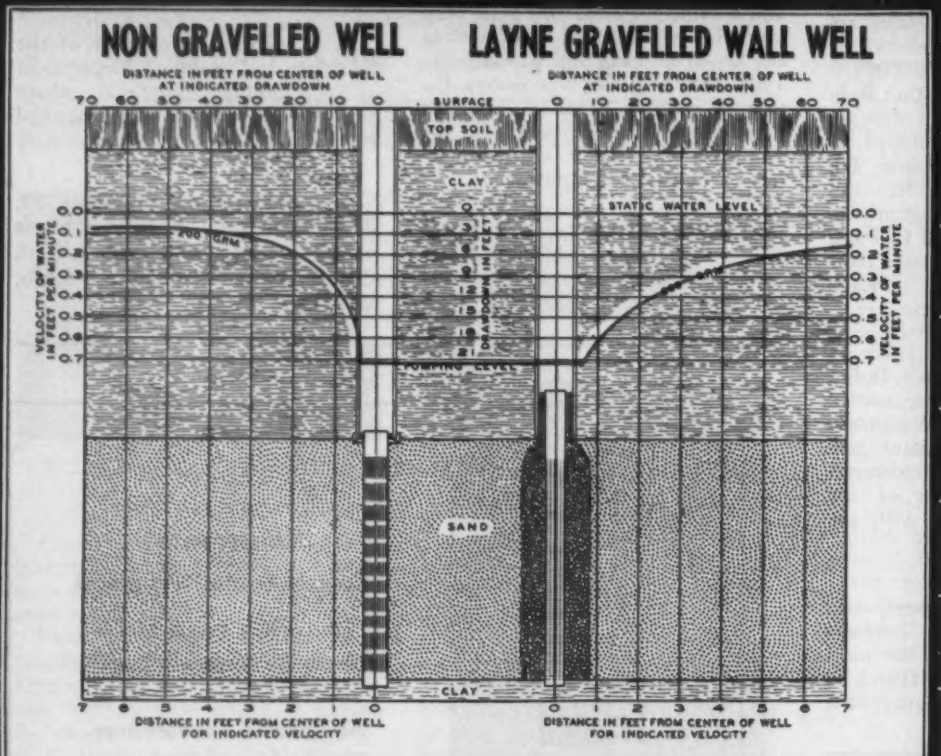

PRODUCTION AND OPERATING CHARACTERISTICS OF TWO TYPES OF WELLS

Above at right is a Layne Underreamed Gravel Wall Well equipped with Layne Shutter Screen. At left is a standard tubular, non-gravelled well with usual metal water well strainer installed in direct contact with the waterbearing sands. Both wells are twelve inches in diameter, finished in the same waterbearing aquifer and equipped with the same diameter and length of screen.

1. Layne shutter screen is designed specifically for use in gravel wall wells.
2. Selection of gravel and thickness of pack surrounding the screen is determined for the individual well unit after careful study of underground formations.
3. Engineering "know how" plus expert supervision eliminates guess work.

The net result is a ground water supply unit which yields more water with less draw down, consequently, low pumping cost and longer producing life—a unit which pays dividends on original cost.

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THROUGHOUT THE WORLD

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SAFETY NEWS

First Quarter of NSC Contest Nets 196 Perfect Scores

FOR THE THREE-MONTH period of January to March, 196 of 539 contestants hold perfect scores in the 1956 Paper Industry Safety Contest sponsored by the National Safety Council. This may be compared with last year's first period record of 210 out of 518.

The March frequency rate for all divisions was 6.95, and that for the first quarter was 6.88, as compared with 6.71 for the January-March period in 1955, a rate increase of 3 per cent. In the Pulp & Paper Div. the three-month rate was 6.56, up 1 per cent from a year ago. Paper Converting reported a 6 per cent increase — 7.80. Pulpwood Logging recorded 64.39 for the quarter, or a 26-per cent reduction from last year.

Perfect scores recorded for the first quarter were as follows:

Division I—Pulp and Paper Mills

Group A

Champion Paper & Fibre Co., Texas Div., Pasadena; Longview Fibre Co., Longview, Wash.; Canadian International Paper Co., La Tuque, Que.; Flintkote Co., Pioneer Div., Los Angeles; Ecusta Paper Corp., Pisgah Forest, N.C.; Gardner Board & Carton Co., Middletown, Ohio.

Group B

Price Bros. & Co. Ltd., Riverbend, Que.; P. H. Glatfelter Co., Spring Grove, Pa.; International Paper Co., Otis Mill, Chisholm, Maine; Coosa River Newsprint Co., Coosa Pines, Ala.; Munising Paper Co., Munising, Mich.; Crown Zellerbach Corp., Port Townsend, Wash.

St. Lawrence Corp. Ltd., Red Rock, Ont.; National Container Corp., Valdosta, Ga.; Brunswick Pulp & Paper Co., Brunswick, Ga.; Canadian International Paper Co., Hawksbury, Ont.; Mosinee Paper Mills, Mosinee, Wis.; Provincial Paper Ltd., Port Arthur, Ont.

Thor Corp., Allied Paper Mills Div., King Mill, Kalamazoo; Kimberly-Clark Corp., Terrace Bay, Ont.; Georgia Kraft Co., Macon, Ga.; Mead Corp., Lynchburg, Va.; Eastern Corp., Lincoln, Maine; Manitoba Paper Co., Ltd., Pine Falls, Man.

Riegel Paper Corp., Acme, N.C.; Rayonier Inc., Jesup, Ga.; West Virginia Pulp & Paper Co., Williamsburg, Pa.; Johns-Manville Corp., Manville, N.J.; P. J. Schweitzer Inc., Smith Paper Div., Lee, Mass.

Group C

Puget Sound Pulp & Timber Co., Bellingham, Wash.; Fitchburg Paper Co., Fitchburg, Mass.; Gaspesia Sulphite Co. Ltd., Chandler, Que.; Schmidt & Ault Paper Co., York. Pa.; International Paper Co., Southern Kraft Div., Mobile; St. Regis Paper Co., Nashua River Div., E. Pepperell, Mass.; National Vulcanized Fibre Co., Yorklyn, Del.

Charmin Paper Mills Inc., Div. "B", Green Bay, Wis.; Kansas City Star Co., Flambeau Paper Div., Park Falls, Wis.; Crystal Tissue Co., Middletown, Ohio; Consolidated Water Power & Paper Co., Wisc. River Div., Stevens Point, Wis.; Rayonier Inc., Shelton, Wash.; Bird & Son Inc., Shreveport, La.

Falls Paper & Power Co., Oconto Falls, Wis.; Fraser Companies Ltd., Newcastle, N.B.; Thor Corp., Allied Paper Mills Div., Bardeen Mill, Kalamazoo; St. Regis Paper Co., Sartell, Minn.; Building Products Ltd., Montreal, Que.; MacMillan & Bloedel Ltd., Harmac, B.C.

Group D

Congoleum-Nairn Inc., Cedarhurst, Md.; National Container Corp., Big Island, Va.; Certain-Teed Products Corp., E. St. Louis, Ill.; Certain-Teed Products Corp., Savannah, Ga.; U.S. Gypsum Co., Oakmont, Pa.; Mead Corp., N. Leominster, Mass.

Crown Zellerbach Corp., Lebanon, Ore.; Container Corp. of America, Ogden Div., Chicago; Marathon Corp., Ashland, Wis.; Certain-Teed Products Corp., Niagara Falls, N.Y.

Philip Carey Co. Ltd., Lennoxville, Que.; Strathmore Paper Co., Woronoco, Mass.; Container Corp. of America, Chattanooga, Tenn.; Mead Corp., Nashville,

PROUDLY DISPLAYING their accident-free record are department representatives of Georgia Kraft Co. in Macon, Ga. On March 19 the firm completed 1,000,000 man-hours without a lost-time accident and on March 31 exceeded its previous plant record of 1,042,415 hours. As of the end of April the record was unbroken. The last lost-time accident took place June 2, 1953. During 1955 the average frequency rate for southern pulp and paper mills was 7.43. In the same period Georgia Kraft's rate was 4.00. Mill men pictured are (l to r) A. E. Wilson, paper mill; A. R. White, woodyard; J. A. May, resident manager; M. L. Cooper, pulp mill; E. H. Smith, power; W. M. Clifton, maintenance; W. M. Ebersole, manager of production, and W. M. Sloan Jr., safety supervisor

Tenn.; Riegel Paper Corp., Hughesville, N.J.; MacMillan & Bloedel Ltd., Alberni, B.C.

Group E

National Gypsum Co., Garwood, N. J.; Celotex Corp., Cleveland; Flintkote Co., Mt. Carmel, Ill.; National Gypsum Co., Kalamazoo; Celotex Corp., Metuchen, N. J.; U. S. Gypsum Co., N. Kansas City, Mo.

Robert Gair Co. Inc.; Middletown, Ohio; American Writing Paper Corp., Nonotuck Div., Holyoke, Mass.; St. Regis Paper Co., Herrings, N. Y.; Canadian Johns Manville Co. Ltd., Asbestos, Que.; U. S. Gypsum Co., Oakfield, N. Y.; Kimberly-Clark Corp., Kapuskasing, Ont.

National Gypsum Co., Pryor, Okla.; Central Fibre Products Co. Inc., Denver; U. S. Gypsum Co., Gypsum, Ohio; Alton Box Board Co., Carlyle, Ill.; International Paper Co., Livermore Falls, Maine; Robertson Paper Box Co., Montville, Conn.

Container Corp. of America, Wilmington, Del.; Johns-Manville Corp., Tilton, N. H.; National Vulcanized Fibre Co., Marshall Bros. Div., Yorklyn, Del.; American Writing Paper Corp., Mt. Tom Div., Holyoke, Mass.; Charmin Paper Mills Inc., Little Rapids, Wis.

Logan-Long Co., Franklin, Ohio; U. S. Gypsum Co., Galena Park, Texas; Spaulding Fibre Co. Inc., N. Rochester, N. H.; Marathon Corp., Neenah Label Specialty Plant, Neenah, Wis.; Amalgamated Roofing Mills, Chicago.

Division II—Paper Converting

Paper Bags

St. Regis Paper Co., Three Rivers, Que.; Bemis Bros. Bag. Co., Mobile; Union Bag & Paper Corp., St. Louis; Virginia-Carolina Chemical Corp., Bag Div., Atlanta; St. Regis Paper Co., Toledo; Thilmany Pulp & Paper Co., Kaukauna, Wis.

St. Regis Paper Co., Los Angeles; St. Regis Paper Co. Ltd., Dryden, Ont.; St. Regis Paper Co., Tacoma, Wash.; St. Regis Paper Co., Nazareth, Pa.; St. Regis Paper Co., San Leandro, Cal., Pillsbury Mills Inc., Wellsburg, W. Va.; St. Regis Paper Co., Playa Ponce, Puerto Rico.

Boxes and Cartons

Group A

Kieckhefer Container Co., Delair, N. J.; Container Corp. of America, 35th St. Plant, Chicago; F. N. Burt Co. Inc., Buffalo, N. Y.; Container Corp. of America, F-C Div., Manayunk, Pa.; Michigan Carton Co., Battle Creek, Mich.; Sealright Co. Inc., Kansas City.

Container Corp. of America, Boston; Bartgis Bros. Co., Ilchester, Md.; Container Corp. of America, Rock Island, Ill.; Container Corp. of America, Valley Forge, Pa.; Hankins Container Co., Union, N.J.

Robertson Paper Box Co. Inc., Montville, Conn.; Mengel Co., Louisville, Ky.; International Paper Co., Chicago; International Paper Co., Springhill, La.; International Paper Co., Somerville, Mass.; International Paper Co., Wooster, Ohio.

Group B

Container Corp. of America, Oakland, Cal.; Crown Zellerbach Corp., Gaylord Container Div., Milwaukee, Wis.; Union Bag & Paper Corp., Trenton, N.J.; Crown Zellerbach Corp., Gaylord Container Div., Greenville, Miss.; Container Corp. of America, Boyle Ave. Plant, Los Angeles; Crown Zellerbach Corp., Gaylord Container Div., Tampa, Fla.

Container Corp. of America, Chattanooga, Tenn.; Mengel Co., Nashville, Tenn.; Mengel Co., New Brunswick, N.J.; Bradley & Gilbert Co., Louisville, Ky.; Container Corp. of America, Fernandina Beach, Fla.; Container Corp. of America, Santa Clara, Cal.

Robert Gair Co. Inc., American Coating Mills Div., Grand Rapids, Mich.; Container Corp. of America, Cleveland; Container Corp. of America, Baltimore; Mengel Co., Winston-Salem, N.C.; Container Corp. of America, Boston.

Hoerner Boxes of Fort Worth Inc., Fort Worth, Texas; Marathon Corp., Sunnyside, Wash.; International Paper Co., Kansas City; Fort Wayne Corrugated Paper Co., Rochester, N.Y.; Dairypak Inc., Clinton, Iowa; Container Corp. of America, Seattle.

Hankins Container Co., Elmira, N.Y.; Hankins Container Co., Miamisburg, Ohio; Container Corp. of America, Seattle; Container Corp. of America, Portland, Ore.; Container Corp. of America, Cleveland.

Hankins Container Co., Little Rock, Ark.; Bay West Paper Co., Green Bay, Wis.;

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Safety News . . .

Mott Carton & Paper Co., St. Louis; International Paper Co., Minneapolis; National Container Corp, Miami.

Roofing Paper

Ruberoid Co., Joliet, Ill.; Pabco Products Inc., Emeryville, Cal.; Flintkote Co., E. Rutherford, N.J.; Ruberoid Co., Dallas; Ruberoid Co., Gloucester, N.J.; Bird & Son Inc., Chicago.

Ruberoid Co., Kansas City; Ruberoid Co., Baltimore; Ruberoid Co., Minneapolis; Certain-Teed Products Corp., Kansas City; Johns-Manville Corp., Marrero, La.

Certain-Teed Products Corp., Dallas; Johns-Manville Corp., Los Angeles; Flintkote Co., Portland, Ore.; Certain-Teed Products Corp., Tacoma, Wash.; Pabco Products Inc., Wilmington, Cal.

Insulation and Building Board

Minnesota & Ontario Paper Co., Insulite Div., International Falls, Minn.; National Gypsum Co., Mobile; Armstrong Cork Co., Macon, Ga.

Specialties

Marinette Paper Co., Fort Edward, N.Y.; Kimberly-Clark Corp., Niagara Falls, Ont.; Old Colony Envelope Co., Westfield, Mass.; International Paper Co., Kalamazoo; Lily-Tulip Cup Corp., Augusta, Ga.; Marinette Paper Co., S. Glens Falls, N.Y.; Container Corp. of America, Sefton Fibre Can Co., Piqua, Ohio.

Scott Paper Co., Sandusky, Ohio; Line Material Co., Sherman, Texas; Mid-West Wax Paper Co., Fort Madison, Iowa; Container Corp. of America, New Orleans; Canadian Cellucotton Co., Winnipeg, Ont.; International Paper Co, Norristown, Pa.; Lily-Tulip Cup Corp., Monticello, Ind.

Division III—Pulpwood Logging

Robert Gair Co. Inc., Southern Advance Bag & Paper Div., Hodge, La.; St. Regis Paper Co., Woodlands Operations, Tacoma, Wash.

Safety Record Reaches New High, APPA Reports

The pulp and paper industry's injury frequency rate has been cut by nearly one-half since 1950. According to a recent report from the American Paper & Pulp Association, pulp and paper is now on an equal footing with the average safety record for all American industry.

The injury frequency rate reported by mills throughout the country showed a drop to 9.4 in 1954, as compared with 11.8 in 1953 and 17.1 in 1950.

E. W. Tinker, executive secretary of APPA, attributed the industry's gains in safety in part to the activities of the APPA's safety subcommittee, which was formed in 1951 to act as the hub for inter-company communication on the subject.

(Accident figures issued for the paper and pulp industry by the National Safety Council and the United States Department of Labor differ slightly from those issued by the APPA, but have also shown distinct improvement.)

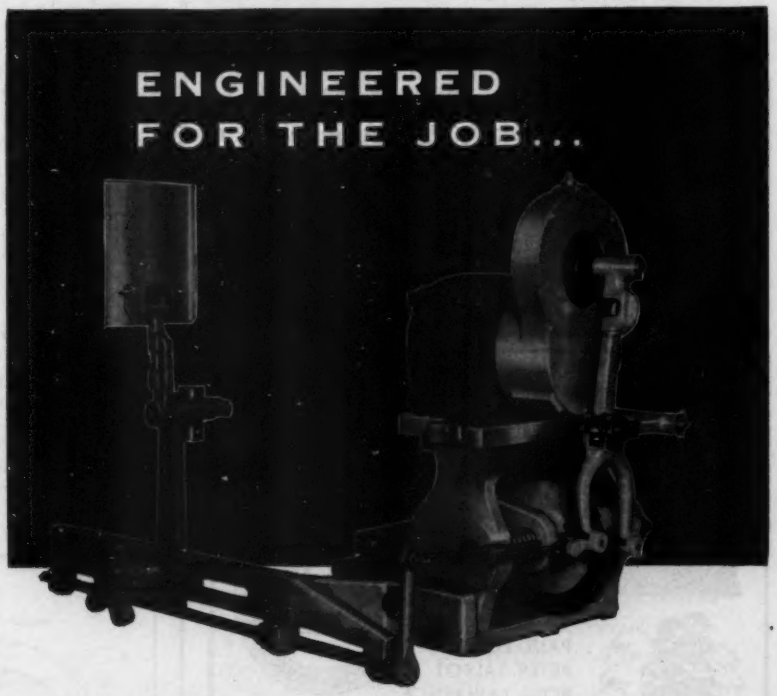
Safety Briefs . . .

The Chester, Pa. plant of **Scott Paper Co.** has won the Award of Honor presented annually by the Pulp & Paper Section of the National Safety Council. The award was in recognition of the mill's lowest frequency incident among Group "A" plants entered in the section's 1955 contest.

The **44th National Safety Congress and Exposition** will be held October 22-26 at the Conrad Hilton in Chicago.

P. H. Glatfelter Co. has qualified for the National Safety Council's Award of Honor because of its injury-free period of 2,664,438 manhours worked from October 26, 1954, to April 1, 1956.

The Kansas City, Mo. plant of **International Paper Co.'s** Single Service Div. has been awarded a divisional first prize by the National Safety Council. The plant recently celebrated its second consecutive year without a lost-time injury.



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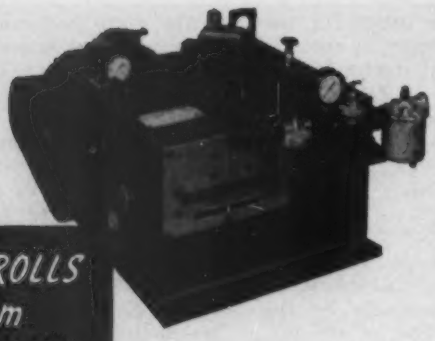
like all Gilbert and Nash guides*—
is engineered for the job!**

Dependability is a built-in characteristic of Model 405 . . . increasing or reduction gear, speeds from 50 to 1200 f.p.m., anti-friction bearings, feather-touch palm. Low initial cost, low maintenance costs make Model 405 an economical installation, too.

Discuss *your* guiding requirements with a technically-trained Gilbert and Nash representative.

GILBERT and NASH company

*Manufactured and sold exclusively by The Appleton Machine Company



KEEP ROLLS from WRINKLING

Install a Ross Midwest Fulton Hydroscillator on your rewinder and keep wrinkles out of your rolls—also hard and soft spots. And what better way to eliminate customer complaints!

Although comparatively new, a score or more mills have already installed Hydroscillators and pronounced them "good"—a really worthwhile help at the rewinder.

Ross Midwest Hydroscillators are hydraulically operated—can be set to deliver strokes of from ½ to 3¼" as required. Oscillating speed from 0 to 24 per minute. Thrust up to 11,000 lbs. Effective on rolls of all sizes—even the very largest. Space required—very little.

Ask for Bulletin No. 101

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PATENT REVIEWS

MELVIN NORD*

Manufacture of paper containing hydroxyethyl cellulose

In U.S. 2,736,633, issued Feb. 28, 1956, to Donald R. Erikson, hydroxyethyl cellulose is employed to produce a sheet of paper having high dry tear strength.

A temporary solution of water-insoluble hydroxyethyl cellulose is formed in very dilute aqueous sodium hydroxide. The paper fibers are then dispersed in the solution. They adsorb a tacky solution of hydroxyethyl cellulose which serves as an adhesive to bind the fibers together when they are felted to form the sheet.

Apparatus for making paper

U.S. 2,736,245, issued Feb. 28, 1956, to Theodore A. McArn, assigned to Downington Mfg. Co., provides improvements for the suction box device and the support of the wire of a fourdrinier paper machine. A large unobstructed suction area is provided, thus aiding in the removal of water. Heavy sliding friction is also avoided, thus reducing the power requirement for the drive.

Two stage pulverizing apparatus

U.S. 2,734,685, issued Feb. 14, 1956, to Tomizo Saito, provides a pulverizing mill in which knots may be treated as well as ordinary pulp.

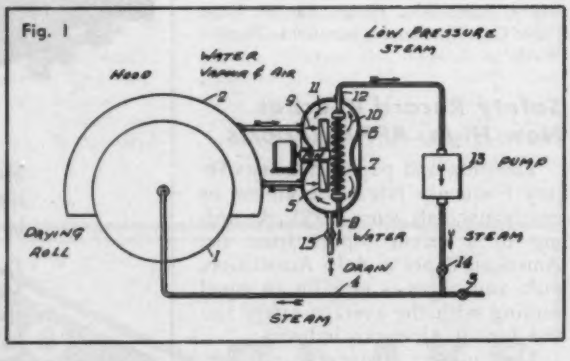
The pulverizing mill incorporates a rotary crusher in which the knot is coarsely crushed, and a second rotary crusher which further subdivides the crushed knot.

Improving the bonding strength of coated papers

U.S. 2,727,837, issued Dec. 20, 1955, to George P. Gregory and assigned to Hercules Powder Co., describes an improved process for preparing a coated paper adapted for printing.

The paper is coated with a composition consisting of a coating pigment (e.g. clay) dispersed in an aqueous solution of a gellable, water-soluble cellulose derivative as the binder, (e.g. hydroxyethyl cellulose), and a setting agent (e.g. magnesium chloride.)

Fig. 1



Re-use of steam from drying rolls

U.S. 2,718,710, issued Sept. 27, 1955, to William W. Spooner, describes a method of conserving heat energy in papermaking machines.

As shown in Fig. 1, a drying roll 1 is steam heated. The mixture of vapor and warm air trapped in the hood 2 is drawn by a fan 5 into a heat interchanger casing 6 through which passes a coiled tube 7 to which water is fed. The fan 5 causes the mixture of vapor and air to flow at high velocity in closed circuit. By virtue of the rapid re-circulation of the air-vapor mixture in the heat interchanger casing 6 it is possible to raise steam in the coil 7 at a temperature not much

less than the temperature of the circulating mixture. The outlet end 12 of the tube 7 is connected to a compressor 13 which discharges through a valve 14 to the pipe line 4 so that when the valve 14 is open and the valve 3 is closed or partially closed the compressor will deliver steam to the drum 1.

The compressor facilitates the generation of steam by the maintenance of a low pressure in the tube 7. This pressure is preferably 5 psi below atmosphere, and the compressor may raise the pressure of the steam thus generated to a pressure of 5 psi above atmosphere.

If desired, the condensate from the drum 1 may be fed to the tube 7, to avoid loss of the sensible heat of the condensate. Likewise, condensate from the casing 6 may be drawn off from the drain 15 and fed to the tube 7.

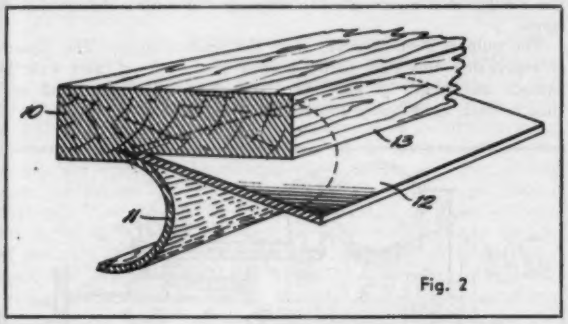


Fig. 2

Wood pulping process

U.S. 2,735,762, issued Feb. 21, 1956, to James d'A. Clark, relates to a process for pulping wood.

It has been found that the cooking liquors used in the digestion processes tend to attack the cellulosic materials in the bruised areas more violently than the remainder, thereby producing inferior pulp. The crushing action which takes place in the conventional production of chips has a very great effect in reducing the tensile or burst strength, the tearing strength, and the folding endurance.

According to the present invention, as shown in Fig. 2, wooden blocks 10 are cut into wafers 11 by means of a cutting edge 12 held parallel to the grain of the wood but cutting across the grain. The wafers thus formed will curl along the axis and parallel to the grain of the wood, so that little if any stresses are imposed on the cellulosic fibers. The patent cites data showing a three-fold increase in burst strength, a 60 per cent increase in tear and tensile strength, and a 20-fold increase in the number of folds. The preferred thickness of wafer is 0.03-0.07 in. A convenient length is 2.5 in.

Multistage acid-alkali cooking

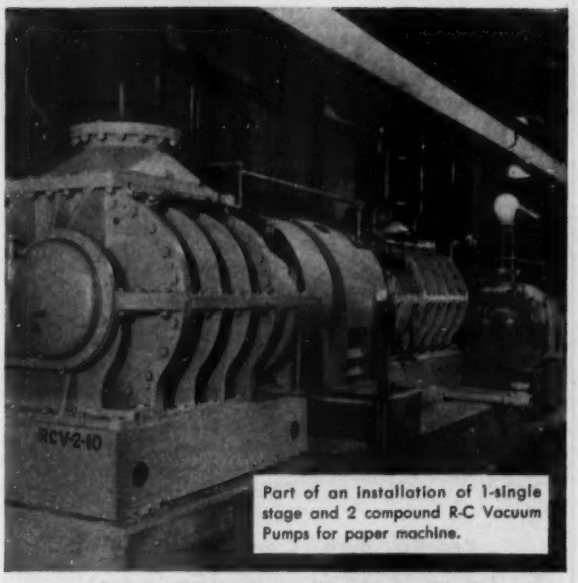
U.S. 2,730,445, issued Jan. 10, 1956, to George Sivola, describes a three-stage acid-alkali cooking process, in which heat and chemicals are recovered.

The first stage of the cooking process uses sodium sulfite or bisulfite made from the fully converted part of the sodium carbonate and sodium sulfide obtained by burning the liquors concentrated by evaportion. In the second stage, the unconverted part of the evaporated liquor, containing sodium sulfide, sodium carbonate and sodium bicarbonate, is injected, converting the cooking liquor from neutral or acid to alkaline. The sodium sulfide causes no difficulty, (e.g. does not react to form free sulfur) when it is present in an alkaline cooking liquor. The third stage of cooking is carried out with an alkaline liquor containing mainly sodium carbonate in addition to the compounds formed in the previous cook.

Production of pulp

U.S. 2,731,344, issued Jan. 17, 1956, to Ralph H. McKee, describes a process for making pulp which is suitable for conversion into paper of high rigidity, particularly wrapping papers, corrugated papers, and liners for corrugated cardboard boxes.

Wood, straw, flax, bagasse, or jute is cooked in a solution containing a hydrotropic salt, such as alkali or alkaline earth salts



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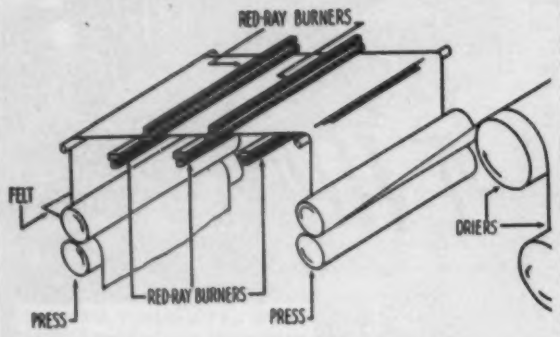

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Patent Reviews . . .

of benzoic, salicylic, xylenesulfonic, cymenesulfonic, phenolsulfonic, or toluenesulfonic acid. The digestive action does not dissolve the cellulose but dissolves the lignin and sets free carbon dioxide. Cold water is then added, thus precipitating the lignin in gelatinous form directly on and in the cellulose fibers. This "cold hydrotropic lignin" is much less polymerized than the customary black lignins.

It is claimed that the paper is thus self-sized and has properties similar to a paper which is impregnated with a thermoplastic resin.

The pulp is then separated from the residual liquor. The liquor is evaporated and then partly burned in a recovery unit with a furnace and boiler to generate steam. The solids produced are then re-used, as described above.

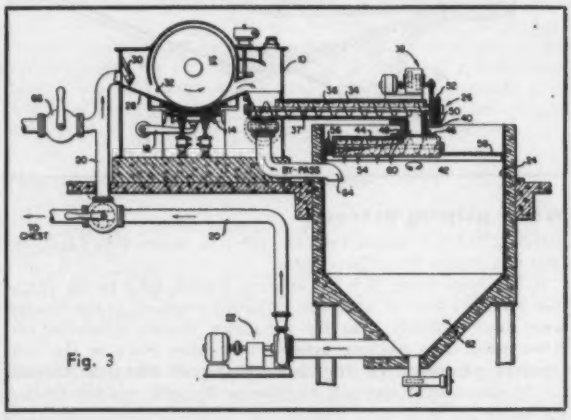


Fig. 3

Beater and stock chest combination

U.S. 2,725,794, issued Dec. 6, 1955, to Frank Hayes, and assigned to The Noble & Wood Machine Co., relates to paper stock treatment apparatus and more particularly to a combination of a beater and stock chest, together with apparatus for maintaining the stock in the chest in progressive, undisturbed layers proceeding through the chest and back to the beater in the same order in which the stock entered the stock chest. The object of the invention is to assure that all of the stock receives treatment for each pass, and that all the stock passes through the treatment area the same number of times.

As shown in Fig. 2, the apparatus includes a base frame 10 on which a beater roll 12 is mounted for rotation in conventional bearings. Associated with the beater roll 12 and likewise mounted within the frame 10 is a bedplate 14 adapted for vertical motion and being actuated vertically by hydraulic elements. The cross-thrust imparted to the bedplate by the roll 12 is taken up holding arms 18 mounted within the base frame 10. Paper stock is pumped to the treatment area between the roll 12 and bedplate 14 through conduits 20 by means of a stock pump 22. After exit from the beater, paper stock is transferred to a stock chest 24 where it is distributed uniformly in layers by means of a stock distributing mechanism 26.

The stock is pumped into the beater under pressure and is distributed across a front approach 28 to the beater roll by means of a distributor head 30. The beater roll 12 is provided with cutter bars 32 which are closely spaced on the order of less than one inch spacing. The purpose for narrow spacing is to provide a substantial treatment of all stock which passes through the treatment area between the roll 12 and the bedplate 14, so that virtually all fibers which pass through the apparatus will receive some treatment such as cutting, brushing or defibrilation.

After issuing from the treatment area, the paper stock moves directly to a horizontal conduit 34 containing a screw conveyor 36 mounted for rotation on a shaft 37. At the far end of the conduit 34, stock descends through a vertical conduit 40 to a second

horizontal conduit 42 which is provided with a second screw conveyor 44. The conduit 42 makes a circular sweep around the upper surface of the stock chest 24 and is driven through a gear arrangement by the motor 38. A longitudinally extending weir 60 is mounted within the conduit 42, and, by gradually descending along the length of the conduit 42, effects an even distribution of the stock into the chest 24.

Thus, the stock passes on its way from the beater to the stock chest 24, through the conduit 34 downwardly through the vertical conduit 40 and then outwardly through the horizontal conduit 42. As it passes outwardly through the conduit 42, the stock spills progressively over the weir 60 and falls into the stock chest 24 evenly and uniformly distributed about the surface. In order to prevent channeling and to preserve the stratified and progressive relationship of the stock, the stock chest 24 is provided with a conical bottom 62.

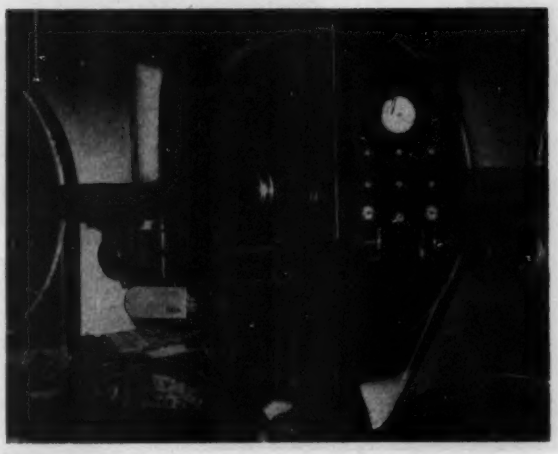
The operation of the apparatus is as follows. Raw or "slush" pulp is pumped to the beater through a conduit 66 and passes through the treatment area before entering the stock chest 24. At this stage of the operation, it is not necessary to employ the stock distributing mechanism 26 and the stock may be admitted directly to the chest 24 by means of a bypass 64. In a representative example, the stock will be pumped to the beater at a rate of 800 gpm and the stock chest will have a capacity of 3200 gal. When the stock chest 24 has been filled, conduit 66 is closed off and the pump 22 is put in operation, to draw stock from the bottom of the chest 24 and pump it through conduit 20 up to the treatment area of the beater. Once the pump 22 is engaged and the feed of the stock stream to the treatment area is drawn from the bottom of the stock chest 24, the bypass 64 is closed off and the stock distributing mechanism is put into operation. At this time the horizontal conduit 44 makes a sweeping motion around the upper surface of the stock chest 24, and as stock which has now passed through the treatment area for a second time enters the stock chest 24, it is distributing evenly in layers on the surface of the stock already present. At the end of four minutes in this illustration after the pump has been engaged, all of the stock will have been put through the treatment area for a second time and deposited in successive layers in the chest. In this short time no substantial settling of heavier portions of the stock will take place in the stock chest. The recirculation, of course, may be repeated as many times as is necessary to effect the desired treatment of the stock.

When the full fiber development has been attained, the stock may be drawn off from the bottom of the chest and pumped to the paper making apparatus while new stock is being entered through conduit 66.

Other Patents of Interest to the Pulp and Paper Industry

Subject	Inventor or Assignee	Patent No.	Date
Box blank folding machine	Post Machinery Co.	2,733,643	2/7/56
Cigarette paper wrapper	Ecusta Paper Corp.	2,733,720	"
Bottle carrier	Universal Folding Box Co.	2,733,832	"
Containers	National Folding Box Co. Inc.	2,733,852	"
Method of introducing sulfitewaste liquor into the alkali recovery process in the manufacture of alkaline cellulose	Nils V. Mannhro	2,734,037	"
Repairing jordan plugs	John W. Bolton & Sons Inc.	2,734,261	2/14/56
Refrigerated containers	Gaylord Container Corp.	2,734,349	"
Dewatering apparatus	Brown Co.	2,734,429	"
Method of making molded fibrous products	Jardier Inc.	2,734,430	"
Laminated paper yarns	Donald W. Light	2,734,532	"
Apparatus for handling paper or cardboard containers	Jagenberg-Werke Akt.-Ges.	2,734,657	"
Tray type containers	Morris Paper Mills	2,734,677	"
Pressure vessels for digestion of pulpwood	Great Northern Paper Co.	2,734,824	"
Paper humidity expansion apparatus	Secretary of the Army	2,735,297	2/21/56
Combined slice and adjustable deckle mechanism for Fourdrinier machine	American Writing Paper Corp.	2,735,343	"
Dispensing guide element for cartons	Samuel H. Levinson	2,735,593	"
Pouring spout attachment	Samuel J. Carnes	2,735,594	"
Shipping vessels for television tubes	Richard E. Paige	2,735,606	"

Keeps Moisture Content Within 1/2 of 1%



Stickle system automatically maintains exact moisture content desired . . . restores proper moisture content after breaks up to 8 times faster

● The Stickle Pres-Ten-Trol system automatically maintains the exact moisture content desired within ½ of 1%, regardless of normal variations in machine speed.

It provides instant regulation of steam flow to the dryers with minimum fluctuation in accordance with moisture content of the sheet passing over the dryers . . . maintains any steam pressure desired when paper is off the machine for start-up, wash-up, or wet end break.

The system records or indicates moisture variation of the sheet, steam pressure in the dryers, and time and duration of wet end breaks. All controls and indicating instruments are grouped conveniently in one instrument panel. There are no hydraulic pistons, chains, pulleys or weights.

The Pres-Ten-Trol restores proper moisture content after breaks up to 8 times faster than other methods . . . eliminates guesswork and manual control of steam flow to the dryers . . . lowers steam consumption . . . records moisture content more accurately than more expensive and more complicated equipment . . . reduces customer complaints.

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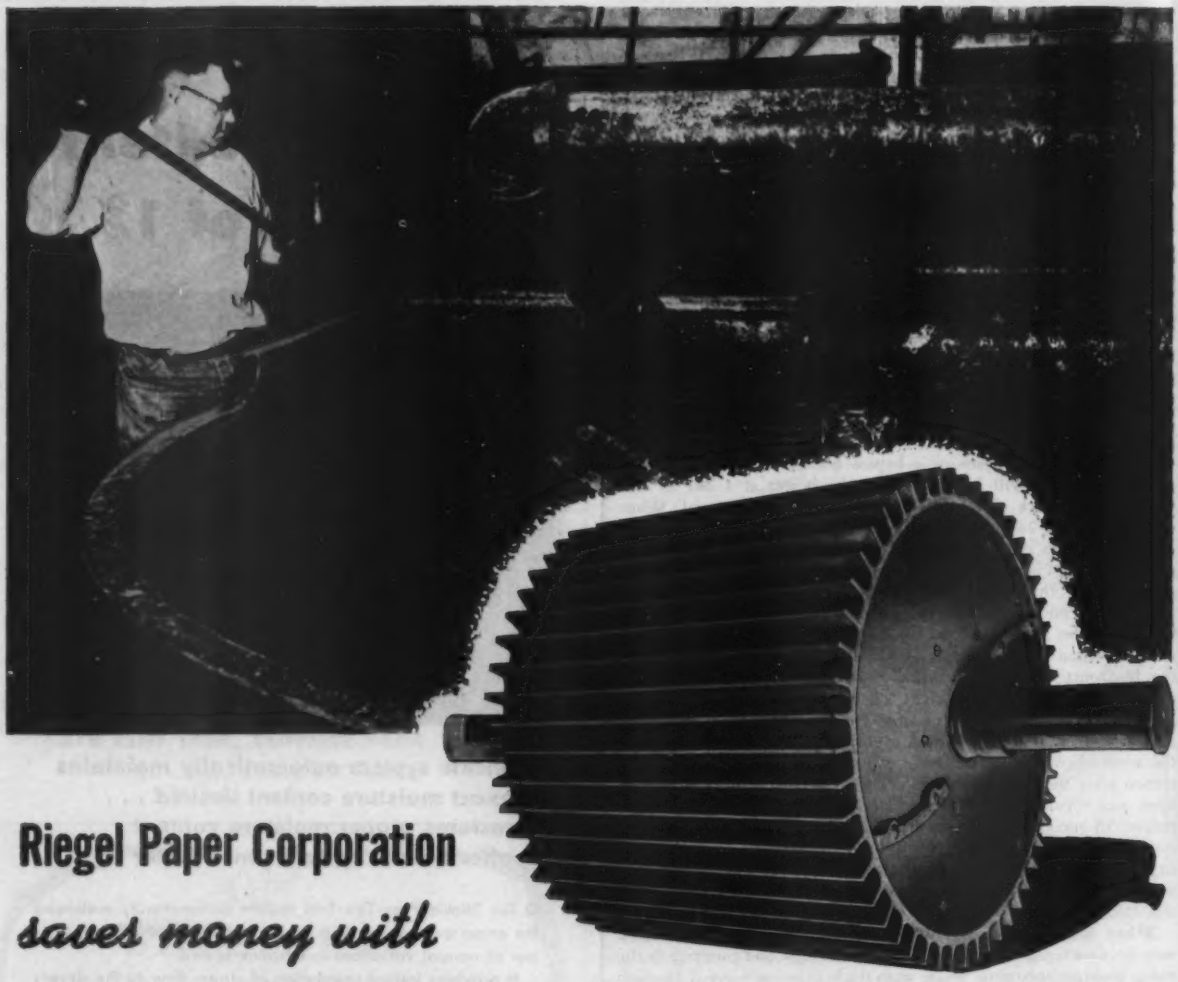

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TISCO® MANGANESE STEEL BEATER ROLLS

TISCO Manganese Steel Beater Rolls are used in Riegel Paper Corporation's many mills where their performance has proven they save money. Their unequalled resistance to the kind of destructive wear encountered in beaters makes replacement unnecessary for exceptionally long periods. Consequently, maintenance costs are reduced substantially.

Although beater rolls are an important application for TISCO Manganese Steel, there are many other uses for this tough, long-wearing material in the pulp and paper industry, where its qualities surpass those of all other materials. Wherever abrasion is accompanied by impact, TISCO Manganese Steel out-performs other steels by a wide margin.

It is extensively used for Jordan fillings, rag slitters, wood chipper spout liners, log haul conveyor chains, attachments, sprockets, barking drum chain, and trunnion rollers to mention the more important applications in the pulp and paper industry.

Ask for further information regarding TISCO Pulp Wood Conveyor Chain, Barking Drum Chain and other chains, Jordan Plugs, Demountable Plug Sleeves and Liners, Beater Rolls and Bed Plates, Rag Slitters, Sprockets, and miscellaneous castings designed to meet your own operating requirements.

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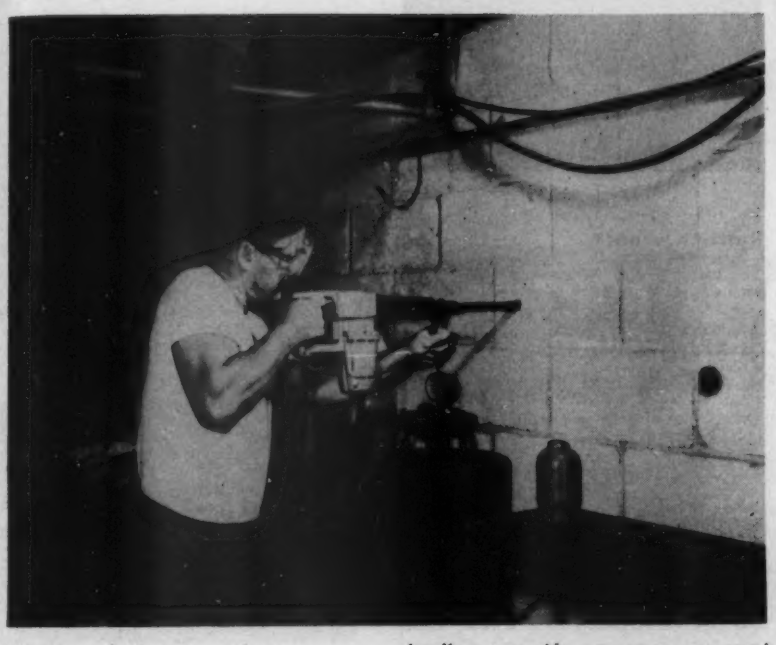


These items are numbered for your convenience. Further information on the various products described may be requested at no obligation through our Readers' Service Dept. Use the business reply card in this issue.

11/ Use readers' service card.

Electric hammer

A new lightweight electric hammer for maintenance and construction work. This will be of interest to all who do star drilling, demolishing, piercing, breaking, etc.

Weighing 12 lbs. 13 oz., the "H54U Electric Power Hammer" will be easier to handle, yet provide more power per pound than my other electric hammer. It will drill holes in concrete up to 1⅛-in. diameter. The tool delivers up to 1900 blows per minute, according to Ingersoll-Rand. It features the neoprene-mounted nozzle which protects the hammer when accidently run without a tool and is designed to prevent leakage and loss of power which sometimes occurs with an air-cushioned piston. *Ingersoll-Rand.*

12/ Use readers' service card.

Winding stands

Engineering the winding stands to suit widely varied applications of this company's winders is giving its basic equipment unlimited applicability. After surveying the winding requirements of the customer plant, they engineer the equipment to do the job with maximum precision and economy. *Hobbs Mfg. Co.*

13/ Use readers' service card.

Fatty alcohol

A new saturated fatty alcohol is a practically odorless, stable, white solid derived from hydrogenated castor oil, melting at 69° C. It has outstanding potential for compounds such as plastics, resins, solubilizers, stabilizers, emulsifiers, polyester and surface active agents—detergent's germicides, textile intermediates, cosmetic waxes and esters. *Archer-Daniels-Midland Co.*

14/ Use readers' service card.

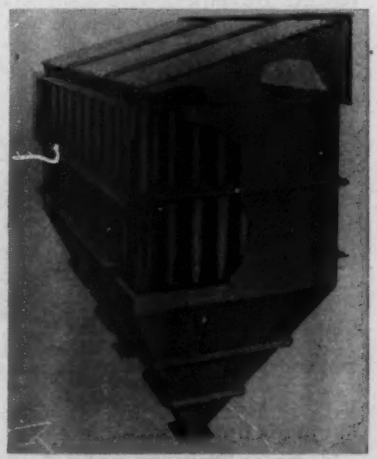
Jordan

Bolton's Emerson Mfg. Co. Div. has announced its re-designed line of jordans which are claimed to be improved in operating efficiency and economy. Some features are: two-section split head on both large and small ends to permit quicker and easier removal of the plug without removing bearings and packing assemblies from the shaft; bearing assemblies consisting of two anti-friction Timken roller bearings, completely encased, in both radial and thrust ends, designed for oil lubrication. A hammered steel shaft is pressed into the plug body under 60 tons hydraulic pressure. Stainless steel or brass sleeves, shrunk onto the shaft, extend from the plug through packing boxes on both shell heads. *John W. Bolton & Sons Inc.*

15/ Use readers' service card.

Recirculating oven

A low-cost recirculating vertical air flow oven reproducing uniform air temperatures and faster results equivalent to higher priced conventional mechanical convection ovens is available. A multi-bladed turbo blower, dynamically balanced and powered by heavy duty ball bearing motor, circulates tempered air down back of the plenum chamber over heater bank and vertically throughout working chamber, giving definite directed air flow. Adjustable alloy baffle permits control of air movements. Higher wattage permits quick attainment of operating temperatures. *Blue M Electric Co.*



16/ Use readers' service card.

Dust collector

This mechanical dust collector of the multiple tube type has a higher collection efficiency and a greater gas flow for a

New Products . . . . . .

given pressure drop than has been previously obtainable in conventional multiple tube collectors. Its unique aerodynamic vane design produces higher velocities in the inlet tubes and increases the gas flow in the outlet tubes.

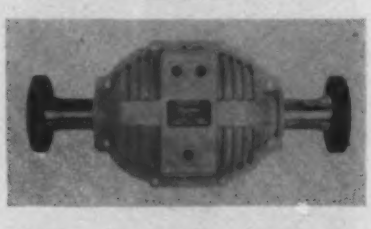
The purpose of the inlet vanes is to start a fast spiral of incoming gas with a minimum of turbulence. The faster the gases spin the greater the centrifugal force on the suspended dust. Drop out and collection efficiency are higher as this centrifugal force is increased. The use of aerodynamically shaped vanes minimizes turbulence and increases centrifugal force.

The outlet vanes recover energy in the outlet tube, increasing its capacity and reducing the number of tubes per unit. *Research-Cottrell Inc.*

17/ Use readers' service card.

Submersible pump

A new 3000-gph submersible multi-purpose pump, identified as the Model 140, has many new features in addition to the long established Kenco submersible pump ease of installation, flood-proof, simple design and freedom from maintenance. New features of the Model 140 include a built-in check valve, air lock eliminator, Kenco-GE Switchette control, Thermoplastic cord and cap and many others. This model is 7½ in. high, 10 in. wide and weighs 25 lb. *American Crucible Products Co.*



18/ Use readers' service card.

Magnetic flow meter

Previously limited to a minimum line size of 2 in., this magnetic flow meter is now available for 1 in. flow lines. The smaller meter offers all the advantages of larger instruments—over-all accuracy of ± 1 per cent of full scale throughout the entire scale, no restriction of flow, linear flow readings, performance unaffected by pressure, viscosity, density or changes in conductivity of the flowing liquid.

The 1 in. meter will handle full scale flows of 10 gpm or greater. It permits accurate metering of the highly corrosive chlorine dioxide solutions used in the bleaching of pulp. *Foxboro Co.*

19/ Use readers' service card.

Ratchet wrench

This one-piece, open-end roller ratchet wrench grips tighter than ordinary end wrenches and is faster than box wrenches. It is designed for use with the two most widely used sizes of tube fittings—¼ and ⅜ in. It is especially useful for tube fittings in close quarters and tight places where the degree of swing is limited. *Crawford Fitting Co.*

20/ Use readers' service card.

Masonry paints

Two new water repellent masonry paints, Siliphane and Silitex, S. F., now are being distributed. Siliphane is a clear water-repellent protective coating and eliminates plaster cracking, paint blistering and damp staining. Silitex, S. F. is a cement paint which provides a protective and decorative coating for outside, inside, above ground and below ground painted surfaces. Silitex is available in several colors. *Upson Co.*

21/ Use readers' service card.

Breaker trap

This new breaker trap is designed specifically for selective defibering of paper pulp. It separates waste material like cellophane, dirt particles, paper clips, staples, knots and shives from the pulp. Conventional screening can then dispose of the particles.

Available in 12 and 18 in. rotor sizes, the trap is being used in mills processing waste paper and defibering broke and is also used in both sulfate and sulfite operations immediately following the blow tank to defiber the pulp prior to screening. *Sutherland Refiner Corp.*

22/ Use readers' service card.

Voltage recorder

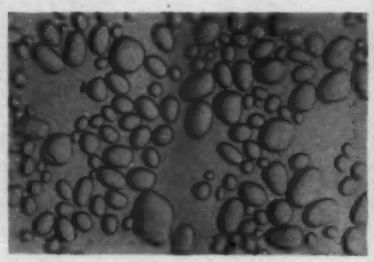
Variations in roll speed for paper mills can be recorded and indicated precisely with this differential voltage recorder. Two instruments are available for increased versatility. One has a scale and chart for direct reading of fpm draw—the stretch of the paper. The other measures and indicates ratio between roll speeds.

A dc tachometer is geared to each of two rolls. Voltage difference of the two tachometers expresses any difference in roll speed. Adjustment allows for difference in gearing and roll size. The recorders are unaffected by changes in operating speeds, recording only draw and ratio during speed-ups or slow-downs. Use of plug-in amplifiers helps reduce down time and simplifies maintenance of the recorder. *General Electric Co.*

23/ Use readers' service card.

Bronze tubing

This 8-in. I.D. seamless corrugated tubing with standard 150 lb. bronze flange is suitable for conveying steam, water, air and also transmitting vacuum. End connections of any type are available. If internal pressures are involved, one or more metallic braid jackets are provided; safe working pressure for one braid is about 100 psi. *Seamlex Co. Inc.*



24/ Use readers' service card.

Arogums

A new family of treated potato starches which offer greater viscosity stability. Known as the Arogums, these new products are already bringing quicker cooking, better luster, greater retention, more flexible coatings and improved penetration to the paper and textile industries.

Arogums are said to be superior with respect to: larger granule size, lessened set-back and narrower limits of viscosity variation. The product is shipped dry in 100-lb. multiwal paper bags. *Morningstar, Nicol Inc.*

25/ Use readers' service card.

Acid pump

An economical acid pump has been designed for removing acid or other liquids

from carboys or other bulk containers, including 55 gal. drums. In operation, a large rubber stopper is inserted in the opening of the carboy and the vent hole is plugged. Plastic tubing inserted in acid receptacle passes through stopper and into acid. A hand pump with 4 ft. of rubber hose is operated to build up pressure inside of container. This pressure can not exceed a safe 8 lb., sufficient to force liquid out in a gentle flow. *Engineered Equipment Co.*

26/ Use readers' service card.

Mobile access lifts

This new line of mobile lifts assures safe working conditions up to 40 ft. above floor level. Hydraulically operated, the lift emphasizes ease of positioning, speed of elevation and safety. It can be used indoors or out and folds up to pass through doorways, narrow corridors, or in and out of elevators.

Maximum stability is assured by screw-type leveling jacks at each corner. Platform area is 2 ft., 3 in. square. The platform has 3-ft. high guardrails and can be rotated through 360°; its load is rated at 350 lb.

All models have 110 v, 60 c single phase pump motor plus hand-operated pump for used where power is not available. *Ballymore Co.*

27/ Use readers' service card.

Fire truck

This fire truck, capable of negotiating narrow factory aisles, is intended for fire-fighting inside industrial plants. It can go anywhere an ordinary plant lift truck can go, and will carry an assortment of fire-fighting equipment. Available accessories include ladders, utility bar, light, hose, portable fire extinguishers and extra nozzles. Dry chemical, carbon dioxide and water are provided as extinguishing agents, according to the plant's need. Storage room for fire blankets, boots, air masks, coats and a first aid kit is also provided. *Ansul Chemical Co.*

28/ Use readers' service card.

Floor material

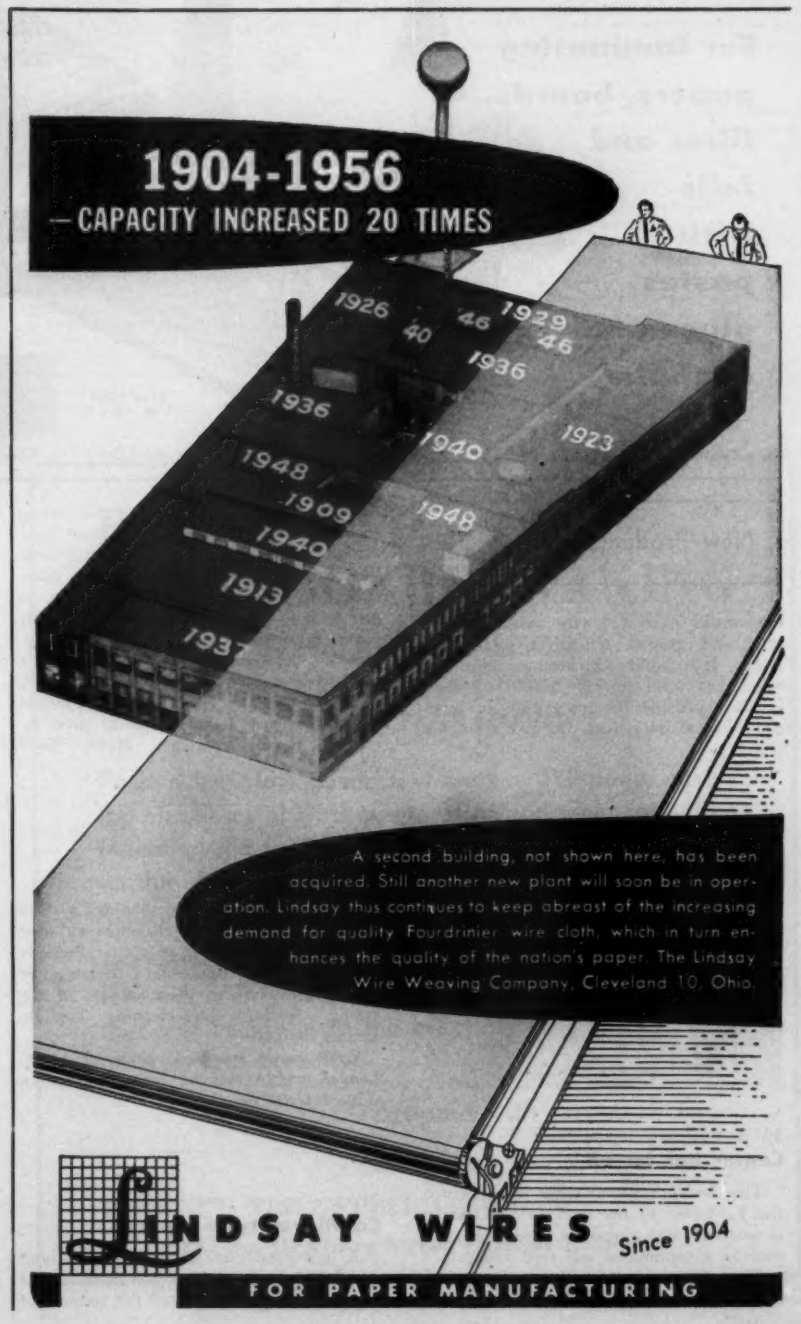
A new corrosion proof floor material provides increased protection from attack by alkalis, solvents and acids. It is intended for application directly over concrete in thicknesses from ¼ to ¾ in. and cures in a few hours' time to a dense impermeable and non-dusting surface.

Adhesion to concrete is excellent and installation data indicate that the bond will be stronger than the concrete itself. Abrasion tests show the new material to be five to six times more resistant to abrasion than most concrete floors with a physical strength about four times greater than concrete's. *Ceilcote Co. Inc.*

29/ Use readers' service card.

Remote alarm

A new automatic remote alarm system, offering both audible and visible warning for abnormal process functions. The sys-



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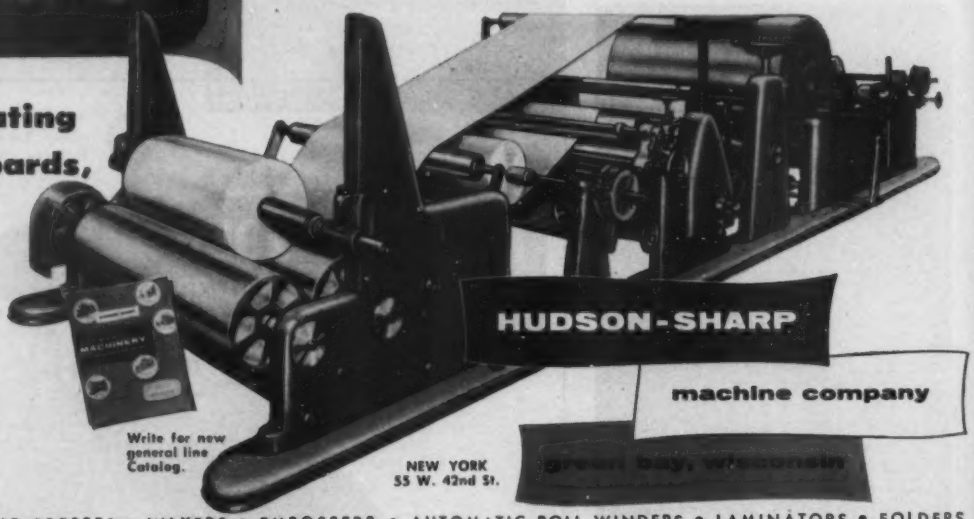

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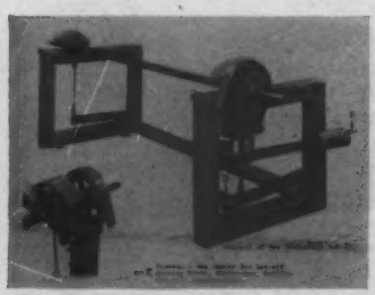
tem works over a 2-wire pair or single wire and ground return up to several miles. It produces a blast audible for more than 2500 ft. The basic alarm unit is also available for integration in other control or alarm system. *Sparks-Withington Co.*



30/ Use readers' service card.

Center bar let-off

This heavy-duty center bar let-off which can be bolted to the floor or attached to a machine was originally designed as a part of a continuous roll feed system.

The self-contained unit rotates on phenolic casters which are designed to withstand the shock of the heavy roll hitting them when the roll is put in place. Specially designed guides position and hold the center bar laterally so that the brake drum and bands are aligned perfectly. A self locking clamp automatically locks the center bar when it is pushed in place. Release of the center bar is by means of a foot treadle. Two piece, extra heavy-duty brake bands are used with lightweight 8 in. diameter brake drums to give increased braking efficiency. *Mount Hope Machinery Co.*

31/ Use readers' service card.

Cleaning rod

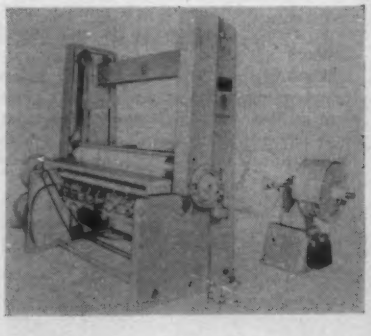
This new cleaning rod employs a cloth swab to do a faster better job of cleaning the inside of liquid gage glases. Pressure can be applied by tightening a thumb screw which results in an increased arc of the spring, forcing the cleaning medium against the glass.

Available in standard lengths of 36 in. Longer lengths may be ordered. *Jerguson Gage & Valve Co.*

32/ Use readers' service card.

Cantilever-type support

A new cantilever-type support has been designed by Instrof Corp. for its system of expanded metal trough for the support of instrument tubing. A twist of the wrist is all that is necessary to secure the Rakit arms to which the Instrof is bolted. The arms themselves are secured to upright channel irons with pre-punched holes that provide a wide number of possible settings. *Instrof Corp.*



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Slitter-rewinder

Rugged framing, perfect balanced rolls, long life anti-friction bearings and use of standard, readily available commercial parts are features of this newly designed line of slitter-winders. Well-grouped controls and minimum number of adjustment points insure ease of operation, while adequate guarding and no loose counterweighting mean safety for the operator. *Black-Clawson Co. Inc.*

NEW LITERATURE

Books

PROCESS CONTROL ANALYSIS. By Millard H. LaJoy and E. Allen Baillif. Instruments Publishing Co., Pittsburgh 12, Pa. 5½ x 8½. 72 pages. $2.00.

The authors of this book have based their treatment on simple representation of the closed-loop system in terms of elementary resistance and capacitance elements, which give rise to ordinary, linear differential equations of fairly low order. These defining equations are then solved analytically, giving insight into the analog-computer and stability techniques that conclude the book.

The utility of this approach is based on the fact that most processes are indeed capable of being simulated by simple R-C elements, and also on the fact that this approach is a simple preliminary step for advancing into more complicated analysis techniques, including transfer-function representation of the system. The jump into the latter, without full knowledge of the former, might result in loss of perspective and "feel" for the system. Therefore, this work represents an essential first step for the control engineer or instrument man who wishes to extend his vision into the field of the frequency response of the closed-loop controlled system.

USDA Reports

BOND AND MAGAZINE BOOK PAPERS AND MILK-CARTON PAPERBOARD FROM OLD-GROWTH DOUGLAS FIR AND RED ALDER PULPS (Report No. 2042). Issued by U.S. Forest Products Laboratory, Madison 5, Wis. This report describes process conditions for the production of bleached and unbleached pulps and presents data to show that (1) bleached sulfate pulp of old-growth Douglas fir can be made into a very good bond paper, (2) it can be mixed with red alder pulp and used for magazine book paper, and (3) it can be used to produce good milk-carton stock.

BREEDING FOR HIGH-QUALITY WOOD. (Report No. 2050). Issued by U.S. Forest Products Laboratory, Madison 5, Wis. This report discusses the relationship between wood quality and such properties as the density of the wood, the proportion of summerwood to springwood in the annual rings, the number of rings per inch, the length and thickness of the wood fibers and the orientation of the fibrils.

INFLUENCE OF LOBLOLLY PINE OVERWOOD ON ADVANCE REPRODUCTION. (Station Paper No. 62.) By E. V. Brender and J. C. Barber. Published by Southeastern Forest Experiment Station, Asheville, N. C. 8 x 10½ 12 pages. This is a report on a study to determine the conditions under which loblolly pine seedling stands become established and maintain themselves ahead of the planned reproduction cut.

Manufacturers' Publications

These items are numbered for your convenience. Copies of the publications may be requested at no obligation through our Readers' Service Dept. Use the handy business reply card which accompanies this issue.

34/Use readers' service card.
Petrothene Polyethylene Resins. U.S. Industrial Chemicals Co. A new edition of this brochure contains information on general polyethylene properties, method of manufacture, uses, methods of processing and fabrication, tables on properties of the 100 and 200 series resins, formulations of the 300 series electrical grade resins, typical electrical, thermal and chemical resistance and film permeability properties.

35/Use readers' service card.
Double Suction Pumps. C. H. Wheeler Mfg. Co. An eight-page bulletin describes and illustrates double suction single-stage centrifugal pumps recommended for general service wherever liquids of low viscosity are to be moved. Cross section drawings and construction details for standard sizes up to 10-in. discharge are included.

36/Use readers' service card.
Fire Pumps. Food Machinery & Chemical Corp. This 36-page bulletin gives complete descriptions of 120 different approved fire pumps, tabulated under approval by Underwriters Laboratories Inc. and Factory Mutual Fire Insurance Companies, and also into groups according to types of drives. Fire pump selection charts are given and fire pump fittings, descriptions of tank filling and jockey pump and pump installation photographs are shown.

37/Use readers' service card.
Engraved Application Rolls. Alclyde Engraving Co. This booklet provides reference data pertaining to pounds of dry solids applied per 100,000 sq. ft. in various cell depths for offset, gravure of helix groove application methods. The information is based on standard solutions of solids and volatile solvents and would be of value in determining the correct engraving to be used for specific machine applications. Illustrations of the basic application cylinders as well as enlarged views of individual offset cells, gravure cells and helix grooves are given.

38/Use readers' service card.
Automatic Transfer Switches. Automatic Switch Co. offers a 16-page brochure on factors to consider in the selection of automatic transfer

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switches. Ten features required for adequate design are concisely listed. Additional information includes selection of type, how to specify the switch capacity and calculating line currents.

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Pneumatic Conveying. Fuller Co. A four-page reprint of a technical article describes a typical bulk handling system. Line drawings, and photographs illustrate the story of a combination vacuum-pressure system.

40/Use readers' service card.

Anti-Corrosive Paints. Subox Inc. An eight-page catalog describes metal protective paints, including ten recently introduced shades. Advantages, technical features and application information are given and a guide for selecting the right paint is included.

41/Use readers' service card.

Armored rotameters. Brooks Rotameter Co. A new 12-page bulletin contains photographs and cutaway drawings of the complete line of armored rotameters. All types of rotameter extensions available are described and illustrated. Details of design and construction, capacity charts and principles of operation are given for all models.

42/Use readers' service card.

Steam Pumps. Worthington Corp. offers a new 23-page bulletin on how to install and take care of steam pumps with step-by-step instructions and 88 illustrations.

43/Use readers' service card.

Automatic emulsifier. Hercules Powder Co. A 12-page bulletin describes the company's low-priced space-saving unit for paper sizing giving the advantages of automatic sizing, equipment and process information and a diagramatic flow sheet of the process.

44/Use readers' service card.

Adhesive additives. Minerals & Chemicals Corp. of America. This technical bulletin on the use and advantages of Edgar aluminum silicate pigments as additives in adhesive systems covers applications in corrugated board, solid fiber laminations, and in paper bag manufacture. Various adhesive formulations are given, as well as the results of laboratory and plantscale tests.

45/Use readers' service card.

Prestressed concrete. Preload Co. Inc. A 4-page bulletin describes current trends in the design and construction of prestressed concrete tanks, including illustrations of typical tanks and standpipes.

46/Use readers' service card.

Sludge removal. Sun Oil Co. How to clean sludge out of hydraulic and lubrication systems without shutting down machines is told in this 4 page bulletin. Use of the company's highly detergent oils to keep equipment clean is also described.

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Farrel-Birmingham Co. offers a 44-page booklet which gives a factual presentation of its ability to design and manufacture a wide variety of heavy machinery and machine tools in its four plants. Facilities at each plant are described and there is a complete list of the company's products.

48/Use readers' service card.

Unit heaters. American Air Filter Co. The latest improvements, specifications, and complete performance data for Herman Nelson horizontal and vertical unit heaters are given in a 36-page product bulletin. Included are complete hot water and steam performance tables, dimensions, selections, applications, descriptions of cabinets, elements, motor mountings, fans and accessories, controls, suggested layouts, piping diagrams and other technical data.

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Steam-jet coolers. Ingersoll-Rand Co.'s current line of steam-jet water cooling units are covered in a new 24-page bulletin. Diagrammatic illustrations, complete listing of sizes available with approximate dimensions, a section on automatic controls, and three pages of installation photographs are given.

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PVC pipe and fittings. Carpenter Steel Co. A 6-page bulletin gives all data on two types of unplasticized polyvinyl chloride pipe and fittings, the normal impact and high impact grades.

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Demineralizing. Graver Water Conditioning Co. A 24-page illustrated article on all phases of demineralizing discusses in detail the advantages and disadvantages of this process for today's power plants. Some of the developments, trends and applications of both multi-bed and mixed-bed ion exchange are given with a complete comparison of the two types of systems. Included also is a complete list of sources of information on the subject, tables, glossary of terms, flow sheets, performance curves, process selection charts and cutaway views.

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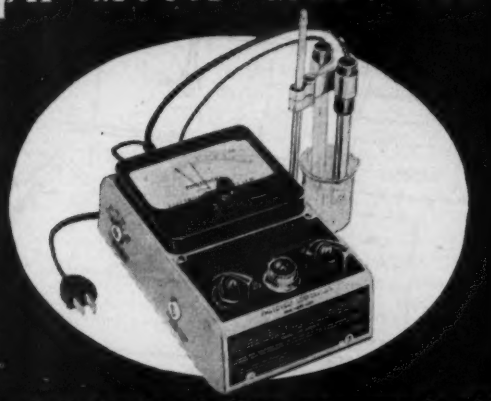

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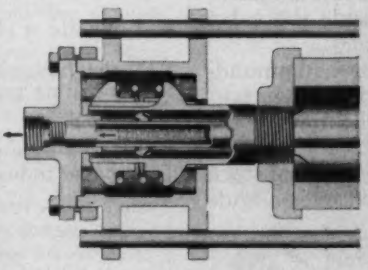

Write for complete information. Johnson Joints are also furnished in pipe-supported and self-supported types.

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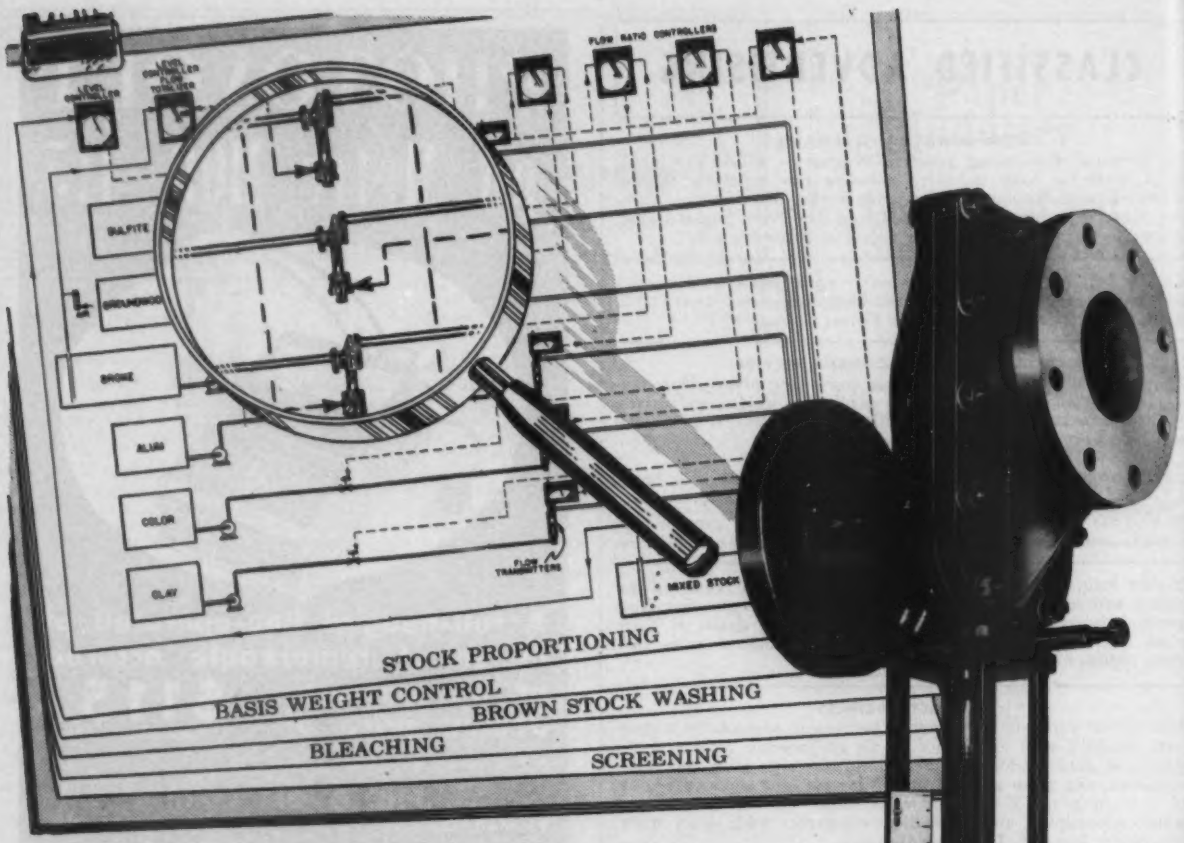

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FOREIGN ABSTRACTS

Adsorption of xylan on cellulose during kraft cooks

Xylan which is dissolved in the black liquor in the course of a sulfate digestion is, in part, adsorbed by cellulose fibers. This was shown repeatedly in carefully devised experiments, in which the wood chips (but *not* the cooking liquors) were kept separate from the fiber on which the xylan was sorbed. Adsorption is evidently dependent on the nature of the cellulose. For example, under identical conditions, raw cotton and purified cotton linters adsorbed about twice as much xylan as that taken up by a cold-alkaline-purified spruce sulfite pulp.

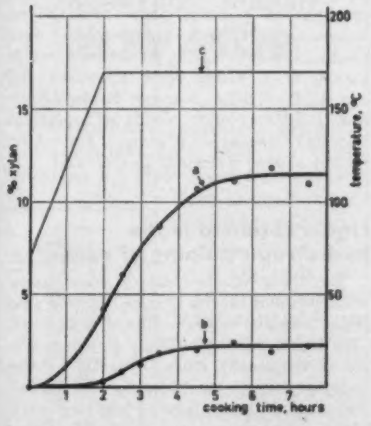

Fig. 1. Amount of xylan adsorbed on purified cotton linters during the sulfate cook. (a) Birch wood; (b) spruce wood; (c) cooking temperature

The amount of xylan in the wood being pulped is also a factor in the amount adsorbed. This is shown in Figure 1. Here the xylan adsorbed is essentially proportional to the concentration of the xylan in the cooking liquor. Saarnio and Gustafsson determined the concentration of xylan at various (earlier) stages of the cook, and their work showed that the xylan reached a maximum at about the same time that the cook reached its maximum constant temperature (173°C.). Thereafter the xylan content of the liquor decreased, and after 2 hours was only about 1/6 of its maximum value.

Figure 1 also shows that the maximum xylan that is adsorbed does not change appreciably after about 4-5 hours of cooking time (i.e. about 2.5 hours after the maximum cooking temperature has been reached). The figure shows that the amount of xylan adsorbed from a birch cook is about four times as great as that sorbed from a spruce kraft cook.

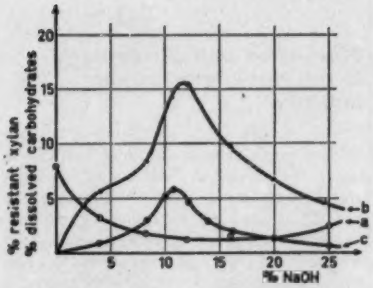

Fig. 2. Extraction curves for cotton linters. (a) Resistant xylan in cotton linters containing adsorbed xylan; (b) carbohydrates dissolved from cotton linters containing adsorbed xylan; (c) carbohydrates dissolved from untreated cotton linters

The xylan adsorption appears to be irreversible. A part of this sorbed xylan is very resistant to extraction with cold alkali (cf. Figure 2). About 20 per cent cannot be removed by cold extraction with 10-20 per cent caustic soda. At higher or lower alkali concentrations this resistance is even higher. Sven Yllner and Barbo Enström. *Svensk Paperstidn.* 59, 229-232 (1956) (in English).

Chemical recovery from dried spent liquor by pyrolysis

This study, which was carried out on a laboratory scale, involved the fluidized pyrolysis of the dried liquor. The dry calcium base powder was blown from a modified fluidized-bed feeder into a bed of carbon residue fluidized by steam. At bed temperatures above 380° C., caking occured, but a smooth operation was obtained within the temperature range of 320° to 380° when the bed was stirred mechanically.

The following products were formed: the carbon residue, a distillate consisting of water and tars, and a mixture of gases, consisting largely of carbon dioxide, carbon monoxide, hydrogen, hydrogen sulfide, and sulfur dioxide. Yields varied depending mainly on the pyrolysis temperatures used. These ranged from 320° to 578° C.

When the contact time was raised from 20 to 40 minutes, no significant changes were noted in the yields. The carbon residue however decreased from 61% (at 320°) to 38.5 per cent (at 578°) both yields being calculated on the weight of the dried, injected powder. The yields of liquid distillate passed through a maximum at about 390°. At 386° this yield was 32 per cent, of which 7.8 per cent was non-aqueous.

With rising temperatures, the gas yields increased. At 320°, the sulfur in the gases was mostly in the form of sulfur dioxide, but at higher temperatures it was largely present as hydrogen sulfide. The greatest sulfur recovery was effected at 471° C, with 72 per cent of the original sulfur present in the gas. In the residue was 16.4 per cent, sulfur and 1.3 per cent was in the distillate. The rest remained unaccounted for.

The carbon residue was tested as a possible filler in natural and artificial rubber,

Correction

On page 251 of our June issue, a typographical error was made. It was printed to read: "Round nitrogen" in ammonium bisulfite pulping. It should read: "Bound nitrogen" in ammonium bisulfite pulping.

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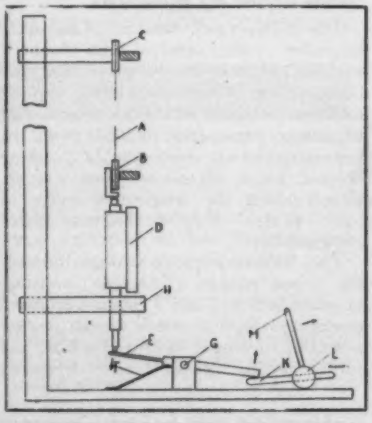
Foreign Abstracts . . .

and on suitable grinding, it showed certain (limited) reinforcing properties. Nine references. W. Rabinovitch, R.H.W. James, T.R. Griffith, and G.L. Osberg *Paper Pulp Magazine of Canada* 57, No 2, 59-64 (1956) (through *Bull. Inst. Paper Chem.* 26,668 (1956).

Production and productivity in the Norwegian paper industry

The author gives a preliminary survey of the special conditions now existing in the pulp and paper industry of Norway, and the problems arising with regard to production and productivity. Actually the industry consists of relatively small units with differing types of production. In order to profit from the advantages of present day technical development, relatively large companies are required. However, in Norway, the raw materials offer little possibilities for expansion in tonnage, and the only possible way to meet this difficulty would be to form amalgamation of the concerns now in existence. This would demand close cooperation between industry and government in a manner comparable with that achieved in certain other countries, so that any such amalgamation would be on a firm financial basis. It would also require extensive cooperation within the industry. Only in some such way can there be a constant improvement in the utilization of the rather limited Norwegian raw materials. Börre Mörch. *Norsk Skogindustri.* 10, 76-82 (1956) (in Norwegian with a brief English summary).



Determination of dimensional stability of printing paper

In printing papers the minimal change in dimensions is often essential. Fig. 1 shows a new instrument used in testing dimensional changes of paper strips (30 centimeters in length). The paper sample (A) is clamped to the upper support (C) and at its lower end is fastened by clamp (B) which is itself connected directly with the dial gage (D) supported by the mounting (H). Prior to the actual experiment, the sample strip is held without tension through the agency of lever (E) that is controlled by the spring (F). When changes in length of (A) are to be measured (E) is released through lever (M) and the paper is thus put under load. Dimensional length changes are then read on (D) to 1/100 of a millimeter, just at the instant at which tension is applied.

Five samples can be tested simultaneously. The entire instrument is encased, and this housing can be sealed so that the paper samples may be conditioned at any desired relative humidity (obtained by introducing suitable salt solutions into the enclosed space). The operation and advantages of the instrument are discussed. The work was done at the German Institute for Research on the Graphic Arts at Munich. Two references. J. Albrecht and W. Ebert. *Wochbl. Papierfabr.* 83, 891-2 (1955) (in German).

Animal size in aiding kaolin retention

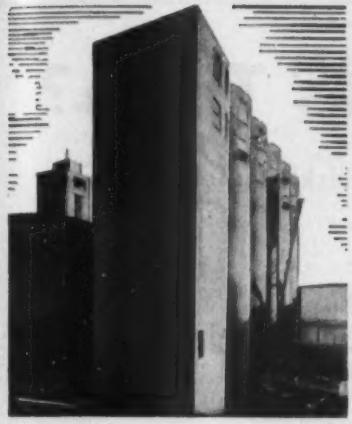
The authors state that 0.075 to 0.1 per cent glue (based on the oven-dry weight of the stock) served in improving kaolin retention in printing paper manufacture. Papers made on high speed machines were produced with a saving of 25-30 per cent kaolin. W. J. Aletin, N. A. Epashowa, and and T. P. Bleisise. *Bumazh, Prom.* (*Paper Ind. U.S.S.R.*) 1955, No 12 (Original in Russian) *through Wochbl. Papierfabr.* 84,230 (1956) (Abstract in German).

Lignin obtained in the hydrotropic pulping of aspen

The spent liquors obtained when aspenwood was pulped with sodium benzoate gave lignin precipitates when diluted with water. This lignin purifed carefully and then subjected to intensive study. Infra-red spectral analysis showed the presence of carbonyl, ether and hydroxyl groups, and the ultraviolet spectrum was quite typical of that of a hardwood ligin. The material was brown, gave a typical phloroglucinol color reaction and contained 61.5 percent carbon, 5.4 per cent hydrogen and 20.1 per cent methoxyl. Details are given for the determination of various acidic groups in the lignin and for the preparation of a number of salts (of which the black nickel salt was analyzed).

The authors, as a result of various analyses and assumptions, suggest that the minimum molecular weight of the lignin is about 1070 (actually the range is from 1025 ± 55 to 1160 ± 180). When the lignin was methylated, the highest methoxyl content reached was 32.1 per cent. When the methylated lignin was saponified it lost one methyl group and certain other unidentified groups. The carbonyl groups in lignin were indicated by the formation of a di-nitrophenylhydrazone.

There is also some evidence for a beta-diketone group in the lignin. A possible condensed formula for the lignin is $C_{65}H_{86}O_{29-32}$, and this, when expanded, appears to contain six methoxyl groups, one carbomethoxy group, two phenolic hydroxyl groups, a (possible) beta-diketone



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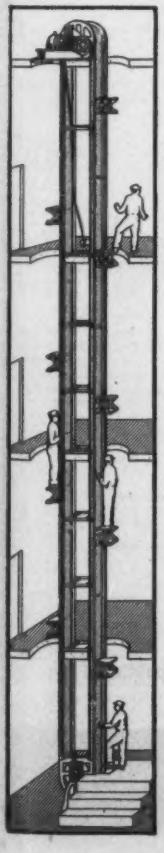

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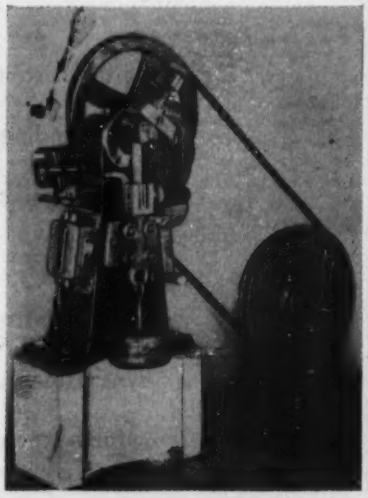
group, two alcoholic (or enolic) hydroxyl-groups as well as four unidentified ester groupings. This is the second paper in a series of studies on hydrotropic pulping, from the French School of Papermaking at Grenoble. P. Traynard and A. Eymery. *Holzforschung* 10, 6-11 (1956) (Original in French). (C.f. *The Paper Industry* 38, No. 2, pp 172-3 (1956).



Folding endurance under varying loads

Folding endurance testers usually operate at speeds of 120-175 double folds per minute. Since kraft papers often require 2000-3000 double folds prior to rupture, and because at least six replicate tests are usually made, a determination of folding endurance takes more time than do most other physical tests applied to such papers.

The present author in seeking to shorten the test periods took a model P.F.I. tester (that of the Norwegian Institute for Paper Research) and supplied it with additional varying weight loads. Thus test strips carried 880 g to 2.8 kg when folded. In this way the number of double folds could be reduced to about 100-200, and the testing time was shortened. There is a linear relationship between the applied load and the logarithm of the number of double folds, and it was possible to express the results obtained with loaded strips in terms of the folds obtained on a normal testing apparatus.

Extension of the line of a graph obtained when testing a paper at different loads gave the intrinsic values that would theoretically show the number of folds obtained at a zero load. Similarly could be shown the load in grams required to obtain a folding endurance of zero. The various makes of unbleached kraft papers tested all showed the identical number of folds at zero load.

In another series of tests, two different folding endurance testers were compared, but there was a rather poor correlation between the results obtained with them. Eight diagrams, six tables and eight references are given. Willy Krohnstad. *Norsk Skogind.* 10, 58-63 (1956) (in Norwegian with a brief English summary).

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A high speed, high shear homogenizer-mixer for complete, "no-vortex" mixing of chemicals, cosmetics and pharmaceuticals to produce emulsions of small particle size and long shelf life.

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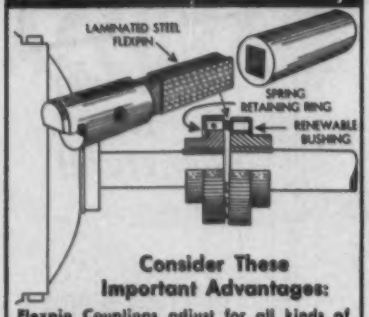

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MARKET QUOTATIONS

RAGS (Domestic)

NEW RAGS

The following are quotations to mills, f.o.b. New York: per cwt.

No. 1 White Shirt Cuttings	14.50 to 15.50
New Unbleached Muslins. .	16.50 to 17.00
Fancy Shirt Cuttings ...	5.25 to 5.75
No. 1 Percales	6.50 to 7.00
No. 1 Washables	2.50 to 2.75
No. 1 Light Silesias	7.50 to 8.00
No. 1 Light Prints	5.25 to 5.50
Light Flannelettes	7.25 to 7.75
Cottonades	3.75 to 4.00
Blue Overalls.....	8.00 to 8.50
Blue Cheviots	8.00 to 8.50
Canton Flannels, Bleached	11.50 to 12.00
Canton Flannels, Unbleached	11.50 to 12.00
Osnaburg Cuttings	11.00 to 11.50
Underwear Cuttings, Bleached	15.50 to 16.50
Underwear Cuttings, Unbleached	15.50 to 16.50
Khaki Cuttings—	
Sun Tan	6.00 to 6.50
Mixed	3.75 to 4.00
Linen Cuttings—	
American	7.50 to 8.00
White	12.00 to 13.00
Grey	12.00 to 13.00

RAGS (Domestic)

OLD RAGS

Quotations to consuming mills, dollars per hundred pounds, f.o.b. New York, follow:

Roofing	Per cwt.
No. 1	1.25 to 1.35
No. 2	1.10 to 1.20
No. 3 and 4	.90 to 1.00
Twos and Blues—	
Repacked	2.75 to 3.00
Thirds and Blues—	
Repacked	2.50 to 2.75
Miscellaneous	2.15 to 2.35
Whites, No. 1—	
Repacked	4.25 to 4.50
Miscellaneous	3.50 to 3.75
Whites, No. 2—	
Repacked	3.25 to 3.50
Miscellaneous	2.75 to 3.00

RAGS (Foreign)

ex dock New York City

NEW RAGS

per cwt.

New Dark Cuttings.....
New Mixed Cuttings.....
New Light Silesias.....
Light Flannelettes.....
Unbleached Cuttings.....
New White Cuttings.....
New Light Oxfords.....
New Light Prints..... } Nominal

RAGS (Foreign)

ex dock New York City

OLD RAGS

per cwt.

No. 1 White Linens.....
No. 2 White Linens.....
No. 3 White Linens.....
No. 4 White Linens.....
No. 1 White Cottons.....
No. 2 White Cottons.....
No. 3 White Cottons.....
No. 4 White Cottons.....
Extra Light Prints.....
Ord. Light Prints.....
Med. Light Prints.....
Dutch Blue Cottons.....
French Blue Cottons.....
French Blue Linens.....
Checks and Blues.....
Linsey Garments.....
Dark Cottons.....
Old Shapperies ..... } Nominal

ROPE and BAGGING

f.o.b. and ex dock New York City

Gunny No. 1—	per cwt.
Foreign	5.50 to 6.00
Domestic	5.50 to 6.00
Wool Tares—	
Light	5.50 to 6.00
Heavy	5.75 to 6.25
No. 1 Scrap Bagging .	4.75 to 5.25
Manila Rope—	
No. 1 large, dom.	7.50 to 8.00
No. 1 small	6.50 to 7.00
Sisal Rope—	
No. 1 large	6.00 to 6.50
No. 1 small	5.50 to 6.00
New Burlap Cuttings....	5.75 to 6.25
Jute Threads—	
Foreign (Nom.).....	6.00 to 6.25
Domestic	6.25 to 6.50
Strings—	
No. 1 sisal.....	4.75 to 5.00
No. 2 sisal.....	4.25 to 4.50
Soft jute.....	4.75 to 5.00
Mixed	2.00 to 2.25

WASTE PAPER

The following are quotations, dollars per ton, for No. 1 packing f.o.b. New York:

Shavings—	per ton
Hard White Env. Cuts.	120.00 to 130.00
Hard White No. 1 ..	100.00 to 110.00
Soft White, one-cut .	80.00 to 85.00
Soft White, No. 1 ..	70.00 to 75.00
Fly Leaf No. 1	40.00 to 45.00
Fly Leaf, Woody No. 1	40.00 to 45.00
No. 2 Mixed Col. Woody	35.00 to 40.00
Flat Stock—	
No. 1 Heavy Books and Magazines Repacked .	34.00 to 36.00
Mixed Books	24.00 to 26.00
Ledger Stock—	
No. 1 White	65.00 to 70.00
No. 1 Mixed (Colored)	40.00 to 45.00
Manilas—	
New Env. Cuttings ..	85.00 to 90.00
New Cuts, One-Cut— Extra Manilas	21.00 to 22.00
Manilla Tab Cards, Free of Ground Wood	85.00 to 90.00
Colored Tab Cards ..	65.00 to 70.00
Kraft—	
New Envelope Cuttings	90.00 to 95.00
Tripled Sorted No. 1 100%	45.00 to 50.00
No. 1 Old Assorted ..	32.50 to 37.50
News—	
White Blank	85.00 to 90.00
Overissue	24.00—
No. 1 Folded	19.00—
Old Corrugated Containers	24.00—
New Jute Corrugated Cuts	31.00—
Mill Wrappers	24.00—
Box Board Chips	16.00—
No. 1 Mixed Paper ...	14.00—

CHEMICALS

f.o.b. shipping point

Alum (Papermakers)—	
Lump, cwt.	5.05 to 5.20
Ground, cwt.	4.30 to 4.75
Powdered, cwt.	5.20 to 5.40
Blanc Fixe—	
Pulp, bulk, ton ....110.00—	
Dry, barrels .....115.00—	
Bleaching Powder—	
Drums, cwt	5.02 to 6.50
Casein (Domestic Standard) 20-30 mesh (bags), lb. 80-100 mesh (bags), lb.	30.00 to 31.00
Argentine, lb.	21.00 to 22.00
China Clay—	
Domestic Filler	
Bulk (mine) ton ...	10.00 to 19.00
Domestic Coating	
Bulk (mine) ton....	17.00 to 25.00
Imported (ship side)	
Bulk (lump) ton...	30.00 to 30.00
Chlorine—	
Tank cars (wks) cwt...	3.05—
Gelatine (silicon), lb. ...	1.25 to 1.35
Glyc. (C.P.) drums, lb.	.30½ to .31
Litharge. Powd. bbl. ...	.18 to .19
Rosin (Gum)—	New York, per 100 lbs.
E	9.05—
F	9.05—
G	9.05—
WW	9.30—
Rosin (Wood), carlots, F.O.B. South	6.50—
Salt Cake—	
Dom. bulk (wks) ton	28.00 to 29.00
Imp. bulks on dock— (Atl. ports) ton (Nom.)	22.00—
Soda Ash—	
Bulk (works) cwt. ...	1.45 to 1.50
Paper bags, cwt.....	1.80—
Soda (Caustic)—	
Solid, drums, cwt. ...	4.10 to 4.85
Ground and flake, drums, cwt.	4.50 to 5.25
Sodium Silicate—	
60 deg. 55 gal. drums, (works) cwt.....	1.60 to 1.70
40 deg. 35 gal. drums, (works), cwt.....	1.35 to 1.40
Starch—	
Pearl, 140 lb. bags, cwt.	6.39—
Pearl, barrels, cwt. ..	6.39—
Paper (Sq.) bags, cwt.	6.39—
Powdered, barrels, cwt.	6.60—
Sulphur (Crude) (Mine) bulk, long ton	26.50 to 28.00
Talc—	
Dom. 100 lb. bags (mine) ton	26.00 to 30.00
Canadian	35.00 to 45.00
Titanium Dioxide—	
Barium Pig. bbls., lb.	.24½ to .26½
Calcium Pig, bbls., lb.	.24½ to .26½
Zinc Oxide, bags	14.50 to 15.50

WOOD PULP

Quotations on domestic and Canadian wood pulp, dollars per short air dry ton, delivered consuming mills including basic freight allowances, follows:

Bleached Sulphite .....150.00—	
Bleached Sulphite, Canadian .....150.00—	
Unbleached Sulphite ...130.00—	
Unbleached Sulphite, Canadian .....130.00—	
Bleached Soda .....145.00—	
Bleached Soda, Canadian.145.00—	
Kraft Bleached .....152.00 to 155.00	
Kraft, Bleach., Hardwood .....150.00—	
Kraft, Bleach., Southern.155.00—	
Kraft, Bleach., Canadian.155.00—	
Kraft, Unbleached, Northern .....130.00—	
Kraft, Unbleached, Southern .....117.50 to 122.50	
Kraft, Unbleached, Canadian .....120.00 to 130.00	
Kraft, Semi-Bleached, Southern .....140.00—	
Sulphite Screenings .... 72.50—	
Sulphate Screenings .... 67.50—	
Groundwood ..... 80.00 to 85.00	

Quotations on imported wood pulp, dollars per short ton, on dock American Atlantic ports with varying freight allowances, follow:

Bleached Sulphite, Swedish, freight allowed .150.00—	
Bleached Sulphite, Norwegian, freight allowed.145.00—	
Bleached Sulphite, Finnish, freight allowed.150.00—	
Unbleached Sulphite, Swedish, freight allowed .130.00—	
Unbleached Sulphite, Finnish, freight allowed .130.00—	
Kraft, Unbleached, Swedish, freight allowed..125.00—	
Kraft, Unbleached, Finnish, freight allowed 125.00 to 150.00	
Kraft, Bleached, Swedish, on dock....155.00—	
Kraft, Bleached, Norwegian .....155.00—	

PAPER

Quotations are mill quotations New York City

Boards—

Prices per ton, delivered in New York, 10 tons or more:

Plain chip .....102.50—	
News vat lined chip ..107.50—	
.009 chip, rolls .....100.00—	
Filled news .....102.50—	
Solid news .....107.50—	
White vat lined chip...135.00—	
Chip tube and can stock.122.50—	
Single manila lined chip.152.50—	
Single jute lined chip..137.50—	
Container, 42 lb. .....130.00—	
Kraft liner .....130.00 to 140.00	

White patent coated:

.020 .....175.00—	
.018 .....177.50—	
.016 .....180.00—	

Book Paper f.o.b. New York— per cwt.

Machine coated, two sides	
70 lb. No. 2 enamel; 25 x 4 cases	$18.50
38-500, trimmed 4 sides. Carloads	$17.50
45 lb. enamel, 25x38-500, 4 cases	$14.25
trimmed 4 sides ..... Carloads	$13.25
Uncoated	
55 lb. No. 2 offset, 25x38 4 cases	$16.00
500, trimmed 4 sides ....Carloads	$15.00
50 lb. A Grade English Finish, 25x38-500, un 4 cases	$15.25
trimmed ..... Carloads	$14.25
20 lb. envelope, 17x22-500, untrimmed ..... Carloads	$13.50
16 lb. tablet, 17x22-500 .....Carloads	$12.50

Rag Content Bond—

(White, 5,000 to 10,000 lbs., basis 16 lb.)

100% rag.....	59.80—
75% rag.....	45.45—
50% rag.....	36.20—
25% rag.....	29.70—

Rag Content Ledger—

(White, 5,000 to 10,000 lbs.)

100% rag.....	59.80—
75% rag.....	45.45—
50% rag.....	36.20—
25% rag.....	29.70—

Sulphite Bond—

(White, 5,000 to 10,000 lbs., basis 16 lb.)

No. 1.....	21.00—
No. 2.....	20.75—
No. 4.....	18.25—

Sulphite Ledger—

(White, 5,000 to 10,000 lbs.)

No. 1.....	21.50—
No. 2.....	20.50—
No. 4.....	19.00—

News delivered in New York— per ton

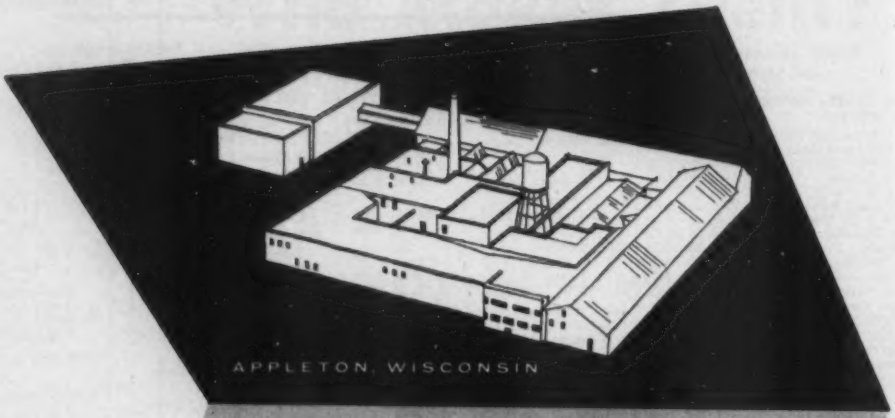
Rolls, Standard (Contract)	129.00 to 132.00
Rolls (Spot)	(Nominal)
Sheets	140.00—

Tissues (Carlots) f.o.b. New York—

	per ream
White No. 1	2.20—
White No. 2	1.90—
Bleached Anti-Tarnish ..	2.40—
Colored	2.20—
Anti-Tarnish Kraft ..	1.85—
Manila	2.20—
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	1.00—
Napkins, full crepe and embossed (12½ lb. to Mshts.) per cs. ..	1.00—
Toilet, Bleached (M shts.) per cs. ..	9.50—
Toilet, Unbleached (M shts.) per cs. ..	8.00—

Wrappings (Kraft) f.o.b. New York— (Basis 50 lb. & heavier) per cwt.

Standard wrapping	8.50—
Butchers, counter rolls..	8.75—
Standard bag, mill rolls.	8.00—
Shipping sack, mill rolls.	8.25—
Gumming, mill rolls....	8.50—
Asphalting, mill rolls...	8.25—
Envelope, mill rolls....	9.75—



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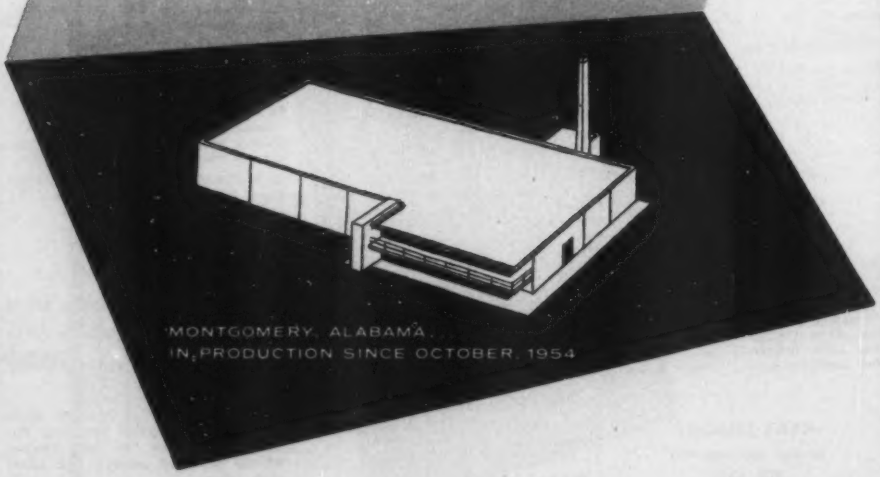

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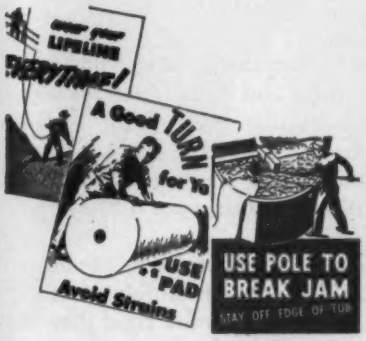

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Chicago 11, Illinois

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PAPER INDUSTRY

Whither?

... in production, processes, new products, markets

Paper of unusual permanence

Paper of unusual permanence is obtained by dipping the sheet into a solution containing a chemical of the nylon group and an additional chemical which, upon drying, leaves a thin film on both sides of the sheet. The edges of the sheet are then trimmed, and the sheet is soaked in water. After the paper between the two films is fully saturated with water, the sheet is split in two by pulling the two films apart. Following this a third film is introduced, and the two sheets are rejoined.

By this process paper of unusual permanence and elasticity has been obtained. Bank notes thus produced are claimed to be absolutely crease- and tear-proof. They can be washed and are only slightly more rigid than those made by the conventional process.

Rising trend of on-the-machine coating application

Currently, more than 1,300,000 tons of paper are coated annually on the paper machine, as against a total of 300,000 tons coated off the machine.

On-the-machine coating is rapidly gaining in popularity, as reflected by the annual rate of increase of the volume of paper so coated. Off-the-machine coating has not shown any significant annual change in total volume over the last decade.

Fiber cartons for cold drinks

A Chicago cold drink manufacturing company is now marketing its ready-to-drink lemonade in snap-cap, milk-type fiber cartons of the quart and 1/3-quart sizes. The larger size is for store delivery and the smaller size for cafeterias and vending machines.

More automation needed

America is on the threshold of a great new era of industrial progress, according to Edwin J. Schwanhausser, president of Worthington Corp. This progress is expected to be of such magnitude that it will tax the available labor supply, which is not expected to increase rapidly enough to handle the demands of industrial production.

Manpower shortage, which will be felt during the next decade, will result in a great acceleration of the development of automation in order to increase industry's productivity. Another factor that will tend to accelerate the development of automation is seen in the demands of unwise labor leaderships.

The importance of optimum pH in hypochlorite bleaching

The quality of bleached pulp is improved by bringing the pH value of the bleaching mixture to 11. Brightness, viscosity, alpha-cellulose and carboxyl group contents are increased—and beta-cellulose, copper number, and yellowing are decreased—as the pH value of the bleaching mixture is increased from 7 to 11.

Shortage of guar bean gum

Shortage of guar bean gum is causing concern in the papermaking world. Consumption of guar gum—the current over-all rate of which has reached 100 long tons per month—continues to increase, while unusually cold weather conditions in Europe during the past winter have ruined some 50 per cent of this year's bean crop. Among the important properties of guar gum is its thickening effect—less than a dime's worth of the gum will thicken one gallon of water to the point of non-flowability.

YOU CAN'T LOSE AT THIS WHEEL!

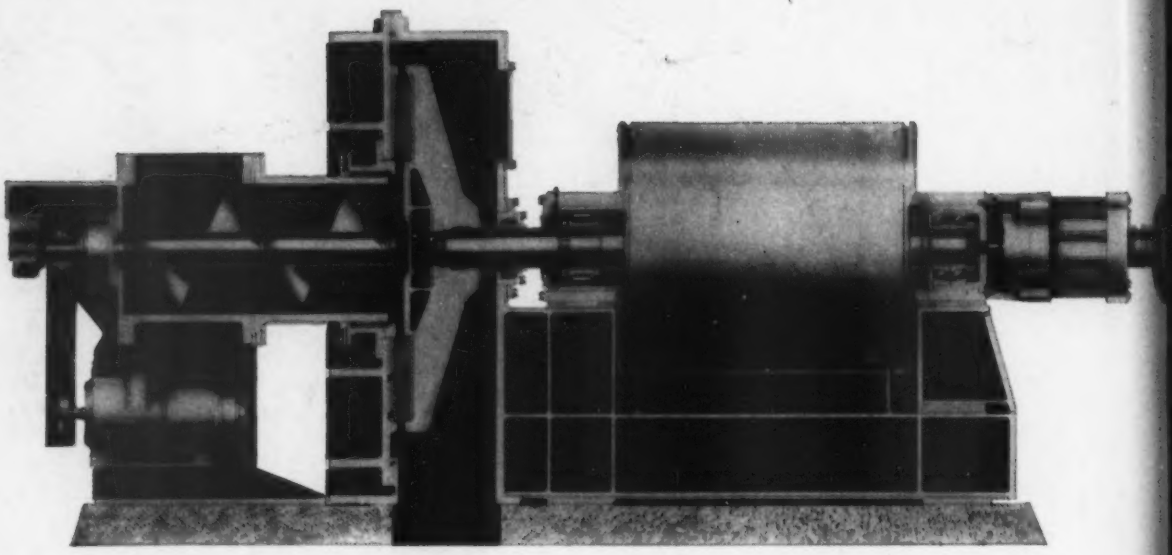
It *is* a wheel of chance—*your* chance to effect savings or increased efficiency or both in your FLOTATION SAVEALL. Your chance, also, to attain BETTER RETENTION.

One of DARLING's six grades of specifically-formulated GLUES will serve you *best* and *most economically*. We'd like to work with you in making a test in your mill—a test which will show which one is exactly right for you.

The entire cost is on us. You can make arrangements through your Darling sales representative. Or write or call us direct.

DARLING'S
improved BONE GLUE

DARLING & COMPANY
GLUE DIVISION
4201 South Ashland Avenue • Chicago 9, Illinois



Here's a Single-Disc Refiner with unique advantages

Far ahead in construction and performance . . . this Bauer Single-Disc Refiner, with free discharge, has the following distinctive features:

1. 40″ rotating and stationary heads—giving extra high capacity.
2. Motor up to 500 hp; induction or synchronous.
3. Modernly designed for utmost ruggedness.
4. Inlet and outlet connections not disturbed when plates are changed; sliding head gives full accessibility to plates; no swinging door; no reserve floor space needed.
5. Welded base water cooled for thermal stability.
6. Case is integral with base; no tee bolts, overhead braces, or other supports.
7. Simple hydraulic or pneumatic controls.

In direct operation against other single-disc machines, the Bauer No. 510 Refiner has shown a wide margin of superiority. Ask us for proof. Write, wire, or telephone FAirfax 3-5501.

Bauer

DISC REFINER
HEADQUARTERS

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